ARCHIVES OF OPHTHALMOLOGY.

GRANULATIONS OF THE CONJUNCTIVA PRODUCED BY LONG-CONTINUED INSTILLATIONS OF COCAINE.

By WILLIAM C. AYRES, M.D., New Orleans, La.

THERE came to my office a short time ago, a lady whose eyes were affected in such a peculiar manner, that I consider a detailed statement of her condition as worthy of note.

Case.—Miss McM., æt. twenty-five, of Vicksburg, Miss., presented herself on July 5, 1888, with a small dense leucoma of the cornea and anterior synechiæ; S = $\frac{20}{100}$. She explained that she had had a severe attack of eye-disease about a year and a half ago. Her eye was very red and painful at the time, and has been more or less so ever since. She said that every week or so her eye was worse and then got gradually better, all of which could be accounted for by her anterior synechiæ. Her family physician had prescribed cocaine to be dropped into the eye as often as desirable, and she had used it from eight to ten times daily for over a year, and was still using it up to the time I first saw her—viz., July 5th.

On examining the palpebral conjunctiva a very striking picture presented itself. This membrane on the lower lid was slightly thickened and seemed semi-translucent (if I may use such a word) over the whole extent. Scattered over it at intervals of about one half of a *mm* there were small round whitish semi-translucent granules of about one quarter of a *mm* in diameter, and quite hard in consistency. They were not easily movable.

They were thickly studded over the area of the fornix and became slightly less numerous up to within about two *mm* of the margin of the lid. Here they ceased, as did also the thickening of the

conjunctiva, allowing the Meibomian glands to be seen, though not so distinctly as in the normal eye.

The conjunctiva of the upper lid was still more densely studded than that of the under lid, and the granules were smaller and more prominent. The same area over the region of the Meibomian glands was free of granules, although the conjunctival tissue was thickened but transparent. The lachrymal canals were entirely closed up by swelling of the tissue immediately surrounding their lumina, and the puncta lachrymalia were protruding, much resembling the condition presented in prolapse of the rectum. We may say that there was a prolapse of these tissues of the canal. A probe could be readily passed into the canal and thence into the lachrymal sac, causing no pain.

The absence of pain in passing the probe through an inflamed swollen tissue was somewhat surprising, therefore after removing the probe from the canal I passed it over the conjunctiva and found the latter perfectly anæsthetic. The leucoma and corneal tissue were only slightly sensitive, and a rough manipulation of them caused but little inconvenience.

The tears had been running over the cheek for several months on account of the closure of the canals, and for the correcting of the closure the probe was passed.

Her lids were treated once daily with cuprum sulphuricum in substance for ten days, during which time there was a marked and rapid improvement of the granulations.

The principal cause of her worry about her eye was the glistening white leucoma—which I proposed to tattoo for her. The first pricking of india ink was done about ten days after her initial visit to the office, and so anæsthetic were the tissues of the eye that it caused no pain at all.

Gradually the eye became more sensitive to the needle-pricking, and pained her very much at night. She had ceased using the cocaine for ten days.

She put in "a few drops" of cocaine, and the granular condition of her conjunctiva returned so rapidly that in one day her eye was almost as bad as it had been in the beginning.

Here I ceased the needle-pricking, and treated the lids with cuprum, when the granulations were quieted down in five days.

Again the pricking was resumed until it became painful and again the lady put in her cocaine, contrary to my instructions, with the same result as recorded above.

Her eyes were dark blue, and the leucoma covered about half the pupil, therefore I let in the ordinary black india ink until the whole leucoma was about the color of her iris. I then traced in my mind about where the pupil would be in the area of the leucoma and made this part of the leucoma very black by a super-supply of black ink. The effect was quite pretty. At a distance of a few feet no defect of the eye was visible.

REMARKS.—This woman had used a strong solution of cocaine (5 %) for over a year, several times daily. It had caused a more or less complete paralysis of the sensory nerves of the conjunctiva and cornea, which did not disappear during the whole time she was under treatment—viz., six weeks.

From the fact that the granular condition of her conjunctiva (only in one eye) rapidly improved under cuprum sulphuricum and cold applications until the granulations were nearly well and then rapidly sprang into prominence again under one night's instillation of cocaine, we are justified in believing the cocaine to be the cause of the granulations. Unfortunately I was not permitted to cut away any of the tissue containing granules for microscopical examination.

INTRAOCULAR HEMORRHAGE AFTER CATARACT EXTRACTION.

By S. E. HILEMAN, M.D., Puebla, Mexico.

Felipa G——, æt. sixty-eight years, large, corpulent Mexican lady, with mature cataract in right eye, of five years' duration, with good indications for operation. Also cataract in left eye, but not quite mature.

Assisted by Dr. Enrique M. Rueda, I operated the right eye June 21, 1888. The patient was operated on the bed that she was to occupy afterward, as is my custom in private practice, and especially when the operation is done without iridectomy.

The operation was very smoothly made, with cocaine as the anæsthetic, without iridectomy, and the cataract extracted without loss of vitreous, leaving a clear, round, and central pupil. The patient was perfectly quiet, scarcely moving a muscle all through the operation. About five minutes later, while awaiting the action of the eserine solution to contract the pupil, before applying the bandage, the patient complained of pain in the right temple and of nausea, both of which passed away in a few seconds. But immediately afterwards the vitreous commenced escaping slowly through the wound in a liquid state. I immediately proceeded to bandage the eye, but before I could do so a great part of the vitreous had escaped, also a few drops of blood. I applied a flannel roller, with absorbent cotton padding, rather tightly, after which the patient felt perfectly comfortable.

In a short while, however, she had nausea again, which soon passed without vomiting. I then took leave of the patient, with instructions to the nurse to notify me in case of accident of any kind, being fully aware that I had one of the exceedingly rare disastrous cases of intraocular hemorrhage to deal with.

I did not see the patient again until next morning, when I

learned that she had had vomiting about four hours after the operation, which was repeated five times at intervals of about half an hour. I found the bandage and padding entirely saturated with blood, and upon its removal I found the globe filled with blood, which was slowly oozing out of the wound. I discovered no vitreous, but was satisfied that it had all escaped. Slight hemorrhage continued for six days, after which atrophy of the globe ensued, with a tardy and painful healing.

There was nothing in the appearance of my patient to cause one to suspect such a result of the operation. The patient had neither heart nor kidney disease. She had had, however, several attacks of articular rheumatism, and was complaining of a little pain in the left leg at the time of the operation. But I did not consider it a contra-indication to an operation.

The hemorrhage undoubtedly came from the vessels of the choroid, the walls of which were weakened by sclerosis, probably caused by the attacks of rheumatism or by a recent attack of choroiditis. As soon as the tension of the eye was lessened by the extraction of the lens, the diseased and weakened walls of the vessels were ruptured, with the above sad result.

PERSISTENT HYALOID ARTERY.

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THE function of the arteria capsularis, the manner of its development, and usual disappearance prior to birth, is of extreme interest to the physiologist. A careful study of the embryological development of the eye as we understand it to-day, accounts for many of the peculiar freaks that were formerly simply called congenital. Such cases as coloboma of the iris, choroid, optic nerve, or persistent hyaloid artery, are of interest to the oculist, and are just as thoroughly understood as the surgeon understands in what manner hare-lip or cleft palate are brought about.

No other organ of the human body has received such careful and persistent investigation; no other organ can offer to the anatomist such striking changes succeeding each other in so short a space of time as the eye. Just what day or hour the eye can first be recognized in the human embryo cannot be said, since it is so exceedingly difficult to obtain any number of specimens in condition for investigation at this early stage. It suffices to say in this connection that the eye is one of the earliest organs to appear in the embryo. The crystalline lens begins to form early from an involution of epiblast. It lies in the optic cup, completely isolated as we find it later, just in front of the space to be occupied in the vitreous. It appears to get its nutrition by absorption up to this time.

The walls of the cup grow rapidly all around except that portion which is opposite the middle of the cup. In the

natural position of the eye this spot is on its under surface, and by not growing, there is a gap left, which is called the choroidal fissure. This fissure extends back into the optic stalk, and through its opening the mesoblastic structure gets into the interior of the eyeball, from which the capsule of the lens and the vitreous humor are formed as well as the blood-vessels. It is known to every one that the arteria centralis retina lies in the interior of the optic nerve, finding its way into the latter by the optic stalk closing around this branch of the ophthalmic artery during the early embryonic development. At an early stage the lens, as we described it above, is surrounded by a capsule which becomes vascular. The posterior surface of this capsule is supplied with blood from branches from the arteria hyaloidea, which gets into the interior of the eye in the same manner as is described above for the central artery of the retina. This small vessel (which is never accompanied by a vein) runs through the centre of the eyeball forward and as soon as it reaches the posterior surface of the lens it divides dichotomously. The small branches pass around the margin of the lens so as to gain its anterior surface, where they supply the anterior capsule and the membrana pupillaris with blood. In the human fœtus at birth these structures have disappeared; they seem to have been necessary for the development of the lens but are not requisite for its later maintenance. The membrana pupillaris disappears early, as a rule, by absorption, but occasionally cases are observed in which a portion of the membrana or of the hyaloid artery persists at birth and remains so during life. Cases have been reported where the pupillary membrana remains intact, but it is counted one of the greatest rarities to find this membrane to contain vessels. The hyaloid artery is seen sometimes in its entire length, but more frequently as a small shrivelled thread still adherent at its origin.

There is another class of cases where vessels carrying blood are found in the interior of the eyeball. Small branches are given off from the retinal vessels, but these formations are always found to be connected with some

pathological process. V. Ammon [1] gives a representation of this condition in his atlas. Recently more light has been thrown on this subject. Weber [2] produces small vessels carrying blood in the vitreous, experimentally, by a process of irritation. Schweigger [3] shows the presence of vessels in the eye as a pathological process. Coccius,[4] as early as 1859, reports an exceedingly interesting case where the vessels took origin from the retina; the vitreous remained sufficiently clear to permit a very satisfactory study of the whole process. It is certainly difficult to say how the vessel walls are formed, and how they make connection with the retinal vessels. While these cases are an anatomical curiosity and exceedingly rare, they must not be confounded with the condition above described, where a portion or all of the embryonic arrangement of vessels for the nutrition and development of the lens and the anterior portion of the eyeball fail to disappear at the proper time. Everbusch [5] observed a case where the embryonal remains seem to indicate that originally there are two systems of vessels in the vitreous, one reaching toward the retina and the other surrounding the lens. Everbusch suggests that many of the cases reported as persistent hyaloid artery are in reality only a haziness of the canal of Cloquet, which occurs on account of irritation. Czermak [6] presents a case where a small vessel leaves the optic papilla, runs directly forward through the vitreous to about its centre, and then returns, spirally winding around its own axis. This small vascular loop showed distinct pulsations, rising and sinking with each systole and diastole of the heart. It is of great importance that a correct diagnosis is made in these cases. Vassaux [7] gives an instance where an eyeball had to be enucleated on account of a persistent hyaloid artery, and when the eyeball was later examined it was found to contain a gliosarcoma which, in its growth, had drawn some

[1] "Krankheiten des Menschenauges."
[2] *Virch. Arch.*, vol. xvi., p. 410.
[3] ARCH. OF OPHTHAL., vol. ii.
[4] "Ueber Glaucom," etc., Leipzig, 1859.
[5] "Beitr. zur Embryologie," München, 1882.
[6] *Centralbl. f. prakt. Augenheilkunde.*
[7] "Persistance de l'artère hyaloïde," *Arch. d'ophthal.*, vol. iii., p. 502.

few blood-vessels forward, giving to them the appearance of persistent hyaloid artery.

In the case reported by Hirschberg[1] there can be scarcely any doubt but that the vessel formation as observed was due to a pathological process, since the patient was suffering with retinitis punctata in the other eye. The same condition is observed by Ulrich,[2] where, in a typical case of retinitis pigmentosa, the author finds thread-like opacities in the vitreous.

Unterharnscheidt[3] reports a case of persistent hyaloid artery where the remains of the vessel were still attached to the central artery of the retina and the capsule of the lens. The case was under observation for some time when finally the fine strand tore in two, due to an increasing myopia, leaving two small ends floating in the vitreous. W. S. Little[4] reported a very peculiar case where he discovered with the ophthalmoscope a vessel leaving the central artery, running forward into the vitreous, turning upon itself, and after reaching the fundus again dividing into three or four small branches, which are finally distributed over the retina.

The vessel had a red appearance, and seemed to carry arterial blood. The remainder of the fundus was normal. Vision was very much reduced, due to amblyopia from disuse, the patient being under treatment for convergent squint. L. later reported another similar case, but the artery here was attached to the posterior surface of the lens, contained no blood, and disturbed vision but little. (Of all the cases reported where blood was found in the vessel, it came from the region of the papilla.)

Schapringer observed[5] in a child a small artery leaving the papilla and extending into the vitreous, where, turning upon itself, it returned to the starting-point. A number of similar cases have been observed from time to time. In a case reported by Galezowski[6] there were two vessels, a vein

[1] *Centralbl. f. Augenheilkunde.*
[2] *Klin. Monatsbl. f. Augenheilk.*, vol. xxi., p. 140.
[3] *Klin. Monatsbl. f. Augenheilk.*, vol. xx., p. 449.
[4] "*Transactions Amer. Ophthal. Soc.*," 1881.
[5] ARCH. OF OPTH., vol. iii.
[6] *Recueil d'ophth.*, 1883.

and an artery. A rupture of one of these vessels caused a hemorrhage into the vitreous. Kipp[1] and Liebreich[2] rightly maintain that a vein accompanying the hyaloid artery does not exist.

It has been claimed that congenital posterior polar cataract is caused by an improper or incomplete resorption of the lenticular capsule and the remains of the hyaloid system. W. W. Seely[3] reports a case where vision was reduced to $\frac{20}{100}$, and on examination of the eye a dark thread-like body attached to the posterior capsule of the lens was discovered. It performed vermicular movements whenever the eyeball was moved. The papilla was normal in appearance. This seems to be the only case on record where the remains of the hyaloid artery were attached to the posterior surface of the lens. As a rule, these embryonic remains are observed in one eye only. I have found but one case recorded[4] where a distinct vessel having all the appearances of carrying blood was found running from the optic papilla to the posterior pole of the lens in one eye, while in the other the same arrangement existed, but the artery seemed shrivelled. It carried no blood.

I had an opportunity of observing a case of exceeding interest at Professor Seely's clinic, where the patient, a Russian refugee, presented himself for the relief of a granular conjunctivitis of both eyes. The majority of these cases are thoroughly tested as to the refractive condition both with the ophthalmoscope and test lenses. In the examination with the ophthalmoscope I saw a peculiar picture. The fundus with the entrance of the central artery and its distribution was distinctly visible, while one large vessel passed forward through the vitreous to the region of the posterior surface of the lens. The vessel at this point divided regularly, formed quite a network, and finally passed to the ciliary region, just posterior to the iris. Vision was reduced to $\frac{20}{100}$, and was not improved by glasses. The lens was perfectly clear, the pupil movable, but the patient complained of a distinct blurring which he had always

[1] K's ARCH. OPHTH., vol. iii.
[2] *Trans. Pathol. Society of London.*
[3] *Trans. Amer. Ophthal.* 1882.
[4] Riebau: *Charité Annal.* i., p. 648.

noticed in the right eye as long as he can remember any thing. The left eye was normal in every respect. This case is of special interest, since it presented the vessels almost exactly as they are distributed during the development of the eyeball, yet the capsule and lens were absolutely clear. The vessels were not mere threads or fibres, but presented a distinctly red appearance. The patient, residing only temporarily at Cincinnati, was kept under observation only a few days.

The literature on this subject records but comparatively few cases where the persisting or embryonic vessels in the vitreous continue to carry blood, while but a single case is known to me where the arrangement of the vessels was somewhat similar, viz., that of Hirschberg. In that instance some critics claim the vessels were new formations, instead of embryonic remains, on account of the existence of retinitis in the other eye.

In the author's mind there is little doubt that the criticism in Hirschberg's case is unjust, and was made on account of its exceeding rarity. The impression made on the observer when he first sees such a case is one of doubt until he has studied it carefully; he hesitates in making a diagnosis, as he rarely sees such a picture. It has been claimed by competent writers[1] that the hyaloid artery has an accompanying vein. Upon a careful investigation of the subject and the cases reported, we are firmly led to believe that there is no hyaloid vein, nor does there seem to be any necessity for one. The branches of the artery inosculate with small vessels coming from the ciliary processes and the iris, and in this manner the blood escapes without the intervention of a system of veins, as is the arrangement in all other organs. Vision in these patients as a class is much reduced, and in the majority of cases reported, myopia of a high degree was found.

Those who may have the good fortune to examine such an eyeball *post mortem* as reported by Hirschberg, or as seen by the writer, might contribute some valuable information to the subject of the development of the eye. Aside from the rarity of these cases that would be the only interest connected with them.

[1] *Recueil d'ophthal.*, 1883.

A CONTRIBUTION TO THE PATHOLOGY OF ALBUMINURIC RETINITIS.

By Dr. JOHN E. WEEKS, New York.

THE following article is based on the histological examination of six globes removed from as many different individuals who suffer from or have died with disease of the kidneys. A short résumé of our present knowledge of the subject is added. Each case showed retinal changes on examination with the ophthalmoscope. One of the cases examined is unique, in that it is one of monocular, hemorrhagic, albuminuric retinitis, in which secondary glaucoma followed, necessitating the removal of the globe. The fellow eye remains good up to the present time, more than a year and a half after the first observation. All of the globes were hardened in Müller's fluid, and embedded in celloidin. Sections were then made, stained and examined.

Case 1.— C. M., forty years, male. In August of 1884 patient noticed swelling of feet and legs, became weak, and experienced pain in head and back, making it difficult for him to continue his labor. In September of 1886 patient was admitted to St. Francis Hospital, Jersey City, where he was treated for Bright's disease. Left the hospital and resumed work after four weeks' treatment. C. M. visited the dispensary at the Ophthalmic and Aural Institute, on March 31, 1887, complaining of loss of vision in the right eye. This was noticed about ten days ago on getting up in the morning. Patient thinks that the failure in vision took place during the night; however, the failure was undoubtedly gradual, but was not noticed sooner as the other eye remained normal. Vision has been steadily diminishing ever since; no pain in the

eye. *Status praesens.* extremities swollen; left ventricle of heart hypertrophied; no murmur; face puffy; urine pale, but normal in quantity; granular and hyaline casts; one third of albumen in the test-tube after heat and nitric acid. Right eye: Very slight pericorneal injection; refracting media clear; many large and small hemorrhages in all parts of the retina; white glistening patches in the vicinity of the disc and at the macula lutea—not numerous; disc swollen; margins hazy; papillitis of about the second degree; vision, $\frac{20}{200}$; tension, $-T_1$. Left eye: Nothing abnormal can be positively determined. Vision, $\frac{20}{20}$.

With the exception of an increase in the number of hemorrhages, the right eye remained in the condition above described until about the 15th of May. The patient was then in a general hospital for the better treatment of his kidney disease. He left the hospital in a few days, and I saw him again about the 25th of May. The media were then hazy; some hemorrhages into the vitreous; pupil enlarged; iris sluggish; anterior chamber shallow; tension, $+T_1$; pain, more marked at night. A 1 per cent. solution of the sulphate of eserine was instilled into the eye four times daily, with the effect of relieving the pain.

June 3d.—Patient's condition much as when last seen; some fibrinous exudation in the anterior chamber. $V = \frac{1}{\infty}$.

June 16th.—Tension $= +T_2$; V=0. pupil one half maximum dilatation; eye very painful. Dr. H. Knapp examined the patient, and agreed with me in advising enucleation. The urine still contains large quantities of albumen.

June 25th.—As on June 16th. Left eye normal.

July 1, 1887.—The eye was enucleated by Dr. H. Knapp, to whose kindness I am indebted for the specimen. The wound healed favorably.

Examination of patient September 17, 1888: Dyspnœa marked; respirations 28 per min.; pulse 120; heart-beat tumultuous and weak; no valvular murmurs; apex beat in sixth intercostal space one half inch to the left of nipple (two and a half inches below nipple); area of heart dulness enlarged; spleen slightly enlarged; liver apparently normal in size; lungs not affected; feet slightly swollen about the ankles; no ascites; mucous membranes pale; radial arteries hard; no headache; bowels constipated; urine pale in color, sp. gr. 1,005; fatty, hyaline, and epithelial casts; albumen one third of test tube; no sugar; some leucocytes and epithelia. Eye: Pupil reacts

well; V = $\frac{20}{30}$ +; no change in the fundus; patient wears an artificial eye over the right stump with comfort.

As indicated above, the left ventricle of the heart is greatly hypertrophied.

Macroscopical appearances: Globe slightly enlarged. Cornea hazy. Anterior chamber shallow. Aqueous turbid. Lens transparent. Vitreous nearly normal in its degree of firmness, grayish-white in color, with remnants of hemorrhages plentiful in the posterior portion. A fibrinous exudation covers the retina in the region of the yellow spot. *Marked glaucomatous cupping of the disc.* The iris, ciliary body, choroid, sclerotic, and optic nerve appear to be normal.

Microscopical appearances: Cornea—small blood-vessels ramifying in Bowman's membrane and in the deep layers of the substantia propria near the sclero-corneal junction are present. Otherwise the cornea is normal.

The iris is thicker than normal; it is pressed against the cornea for about 3 *mm* from its origin, the condition so frequently observed in glaucomatous globes, completely obliterating the iris angle. The increase in nuclei is very slight. There are very marked changes in the walls of the arteries, which will be described later. The veins, pigment layer, etc., are little changed. The anterior chamber is filled with a fibrinous exudation which includes a few leucocytes and red blood corpuscles.

The lens appears to be normal.

A network of fibrine is found throughout the vitreous, and here and there are channels, paths of hemorrhages, in which many red blood corpuscles are found. Large, delicate, branching cells are found in the posterior portion, but are not abundant.

As is usually the case in all forms of albuminuria affecting the eye, the retina is the part most profoundly changed.

The membrana limitans interna is thicker than normal and well defined throughout; the pressure of the exudation into the nerve-fibre layer and the swelling of the tissue of the latter give it a wavy appearance. This membrane is

ruptured in a few places (Fig. 1, *a*), permitting of hemorrhage from retinal vessels into the vitreous.

The nerve-fibre layer shows marked changes. The nerve fibres are swollen by imbibition and are more or less separated from one another. Although the diameters of the nerve fibres are not perfectly uniform, no marked varicosities as mentioned by other writers are observed. The so-called glia-cells are larger and much more distinct than in the normal retina. A scanty infiltration of leucocytes is noticeable, most plentiful in the vicinity of the vessels. Hemorrhages are very general in this layer. Deposits of colloid (?)

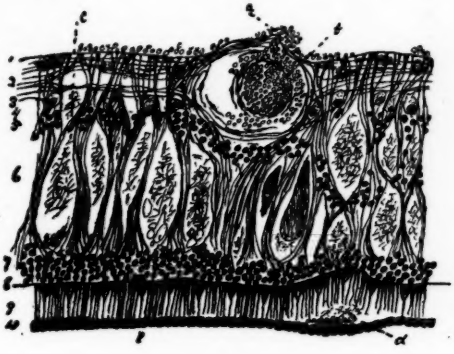


Fig. 1.

RETINAL CHANGES IN CASE NO. 1.

a, rupture of memb. limit. int. and escape of blood corpuscles into vitreous; *b*, rupture in wall of vein; *c*, coagulated exudation, fibrine, blood corpuscles, etc.; *d*, exudation causing separation of ninth and tenth layers of retina; *e*, fat globules.

material, coagulated albumen, and fat are met with, but are not of frequent occurrence. Fibrine, occurring most frequently in isolated spaces, near the disc and macula lutea is also seen. The arteries show marked changes in their walls, by which their lumen is reduced. The veins are enlarged, and are engorged with red blood corpuscles. Probably all of the hemorrhages take place from the veins or capillaries in a manner hereafter mentioned. The ganglion cells are pressed apart in many places by the presence of the exudation; they are swollen, and show much more

prominently than in the normal retina. In some parts of the retina the ganglion cells have undergone a granular degenerative change.

Very marked changes appear in the inner granular, inner nuclear, and external granular or internuclear layers. The increase in the thickness of the retina is caused principally by the distention of these layers. Müller's fibres are here much elongated, and large spaces exist between them (see Fig. 1, *e*), which are filled with coagulated exudation and red blood corpuscles. In some places the retina is nearly normal in appearance, in other places the distortion affects the inner granular layer only, in others the change is confined to the external granular layer, and in still others the spaces extend from the ganglion-cell layer through the inner granular, inner nuclear, and external granular, deep into the external nuclear layer (see Fig. 1). The nuclei themselves appear to be unchanged. Collections of red blood corpuscles are found deep in the external nuclear layer.

The layer of rods and cones is but little affected; near the fovea centralis some red blood corpuscles and exudation have caused a detachment of this layer from the pigment layer (Fig. 1, *d*), and granular degeneration of the rods and cones is seen at this point.

Throughout the greater part of the retina the pigment layer is unaltered, but near the disc there is a hyperplasia of this layer. The newly formed cells are irregular in shape, deeply pigmented, and are heaped up to the thickness of from two to four rows. Their nuclei are quite distinct.

As to the region of the retina affected, I find that the œdema and hemorrhages extend almost to the ora serrata in the nerve-fibre layer. By far the most profound changes are observed in the vicinity of the larger vessels, *i. e.*, at the posterior part of the fundus. At the macula there is an œdematous condition as in other parts, also deposits of a colloid (?) material, which appears to be a portion of the exudation.

The disc presents a glaucomatous cupping of about 1 *mm* in depth (Fig. 2). The excavation is partly filled with

a blood clot (Fig. 2, *a*). The nerve fibres here are atrophic, the layer at the margin of the disc being very thin. There is considerable increase in the number of round cells, which condition is also present in the nerve. The lamina cribrosa is pressed backwards. Numerous hemorrhages have occurred in the tissue of the disc; red blood corpuscles may be traced through the lamina cribrosa into the substance of the nerve.

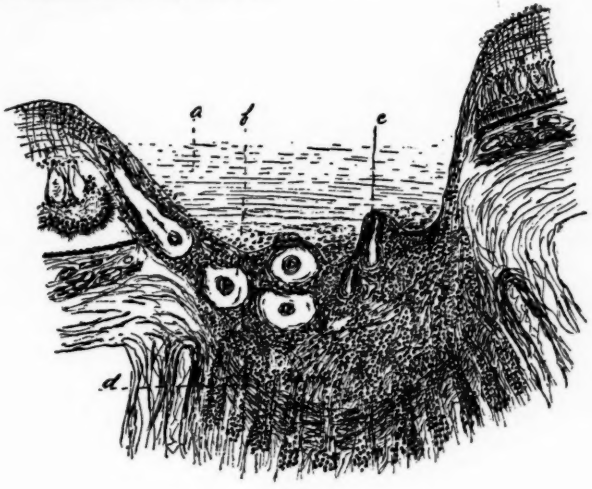


Fig. 2.

EXCAVATION OF THE DISC.—CASE NO. I.

a, blood clot filling excavation in disc; *b*, artery showing hyaline degeneration of wall; *c*, vein; *d*, lamina cribrosa.

The change in the walls of the blood-vessels, which is very appreciable, and to which the retinitis is directly due, consists in a hyaline degeneration of the intima, and in part of the muscularis of the arteries and arterioles, with, in some parts a possible fibrous thickening or sclerosis of the walls of the arterioles. By this change the calibre of the arterial vessels is partly or wholly obliterated. These changes are very well marked at the disc. (See Fig. 2, *b*). The nuclei of the endothelium of the intima are crowded together at the centre of the arterial tube. I have not observed an in-

crease in their number, nor any sign of fatty degeneration in these cells. Except at the disc the veins are distended by red corpuscles with which they are engorged. The diminution in the *vis a tergo*, caused by the decrease in the calibre of the arteries, appears to have produced partial stagnation in the flow of blood through the capillaries and veins, followed by impaired nutrition and distention, permitting of exudation, diapedesis, and hemorrhage from them. A rupture in the walls of a vein, showing escape of red blood corpuscles into the perivascular space and into the tissue of the nerve-fibre layer is shown in Fig. 1, *b*. The drawing is from a section.

The exudation, rich in albumen and fibrine, corresponds to the plasma of the blood; a serous part produces a more or less uniform œdema of the retinal tissue; another part apparently coagulates in pocket-like spaces (situated anterior to the external nuclear layer) very soon after escaping from the vessels. Masses of homogeneous material which appears to be albumen, possibly coagulated during the hardening process, are met with; also masses which take the stain, something as colloid material does, not however so deeply. The last-mentioned material is termed colloid, by Leber[1] and others. It differs from colloid material, however, in that it does not stain so easily, and that it does not appear to be formed at the expense of the tissue in which it is found. Fatty degenerative changes take place in the masses of the exudation; however, this change is probably a slow one, as evidenced by the relatively small amount of fat observed. The deposits of fibrine are very plentiful. Red blood corpuscles are found mixed with the exudation, and are very plentiful in the tissues.

The walls of the arteries in the iris, ciliary body, and choroid, are much affected—the change being similar to that noticed in the arteries of the retina. The veins are also affected in the above-mentioned membranes, but to a much less degree than the arteries. Many of the choroidal veins are engorged with red blood corpuscles, but I have not met with any hemorrhages in the vascular tunic in this

[1] Gräfe-Saemisch, vol. v.

case. The chorio-capillaris is compromised in many places by a sclerotic change in the walls of the capillaries, and obliteration of many of the latter. There is a noticeable increase in the connective tissues of the part.

CASE No. 2.—Adult, male. Death during an acute exacerbation of chronic Bright's disease. Kidneys contracted. The eye was removed about five minutes after death.

Ophthalmoscopic appearance: Media clear; marked papillitis; disc raised about $\frac{3}{4}$ *mm;* outline indistinct. Radiating hemorrhages not very plentiful, but most numerous near the disc. Veins engorged, enlarged, and tortuous. Color of disc and surrounding retina a pale grayish-red. Numerous diffuse and well-defined white patches about the disc and in the vicinity of the fovea centralis. The periphery of the retina shows little change; it is slightly œdematous.

Macroscopical appearance: Size of globe, appearance of cornea, iris, choroid, ciliary body, lens, vitreous, and sclerotic normal. The retina has a grayish tone at the posterior pole. Disc raised.

Microscopical appearance: Retina—the membrana limitans interna is well defined, but is thrown into wavy folds by the exudation beneath. General œdema of the nerve-fibre layer exists throughout. No infiltration of leucocytes. The glia-cells are prominent. There are no deposits of fibrine or colloid material. Hemorrhages are present, but are not numerous. This layer reaches three or four times the normal thickness in some places, due to the excessive œdema. Nerve fibres swollen.

The ganglion-cell layer is undisturbed. The cells themselves, however, are enlarged.

There is but little change in the inner granular layer; it is simply œdematous.

A large number of spaces containing coagulated exudation is seen in the inner nuclear layer. In the external granular layer, the changes are very marked; they consist in the deposition of the exudation in spaces formed by pressing the tissues apart. Müller's fibres are swollen and greatly elongated in this part of the retina. They present no degenerative change. The external nuclear layer, mem-

brana limitans externa, rods and cones, and pigment layer are unaltered.

The changes, except an œdema of the nerve-fibre layer, are limited to the vicinity of the disc and fovea centralis. Anterior to the equator of the globe, no exudation is found. Deposits of exudation occur at and near the macula lutea, but are not observed at the fovea centralis. A condition of general œdema is present at the disc. There is but little increase in nuclei and no apparent hyperplasia of connective tissue. New-formed capillary blood-vessels are present.

Thickening of the walls of the arteries in the shape of a fibro-hyaline degeneration is seen here, but it has not reached the degree observed in Case No. 1. The character of the exudation is the same as that found in the above-mentioned case, consisting of serum, fibrine, albumen, fat, and colloid (?) material, distributed as above stated. The appearance of the deposits gives the impression that coagulation has taken place very soon after the exudation had escaped from the vessels.

Case No. 3.—Male adult. Death in uræmic coma. Ophthalmoscopic examination revealed an œdematous condition of the retina at and near the disc, and a few hemorrhages near the disc. Eye removed fifteen minutes after death.

Macroscopically all parts appear to be normal, except that the disc is slightly raised.

Microscopical examination: The membrana limitans interna is very wavy in outline, due to the œdema of the nerve-fibre layer. It is well defined. The nerve-fibre layer is œdematous throughout. The arterial walls are slightly thickened by hyaline infiltration. The perivascular spaces are greatly distended. The œdema is greatest in the vicinity of the larger vessels. The nerve fibres are enlarged apparently by imbibition. A few leucocytes are observed in the tissue. The ganglion cells are enormously enlarged, but they do not show any degenerative change. Only a moderate œdema is observable in the other layers of the retina. Slight hyaline degeneration is noticeable in the walls of the choroidal arteries.

CASE NO. 4.—Adult male. Death during an acute exacerbation of Bright's disease of the kidneys. The ophthalmoscopic examination showed marked papillitis in both eyes, with a very few hemorrhages near the margin of the disc. A globe was secured very shortly after death, and was immediately placed in Müller's fluid.

Macroscopical examination discloses nothing abnormal with the exception of a marked elevation of the disc, which is of a pale-grayish color.

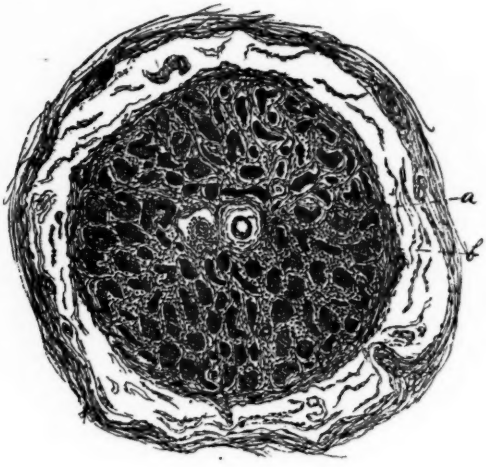
Microscopical examination: The pathological changes appear to be confined to the papilla and nerve. At the papilla the tissue is greatly thickened without great increase in nuclei or infiltration of leucocytes. A new formation of capillary blood-vessels is present in the tissue of the disc. The elevation of the disc is about 1.2 *mm*, and is largely due to simple œdema, Where the deeper layers of the retina border on the opening for the entrance of the optic-nerve fibres, collections of red blood corpuscles are observed. There are also some small hemorrhages in the greatly thickened nerve-fibre layer at the margin of the disc, and some isolated hemorrhages in the same layer, which are grouped about the fovea centralis. The arteries show a hyaline degeneration of the intima, but it has not reached a high degree.

A peculiarity in this case is the relatively great inflammatory change in the nerve, while the retina remains comparatively free. A cross-section of the nerve, Fig. 3, shows an infiltration of leucocytes and a great increase in nuclei and connective tissue. The nerve-fibre bundles appear to be reduced in size and contain numerous nuclei. The walls of both arteries and veins are markedly affected, their lumen being greatly reduced. This is particularly true of the arteries. The change is one of hyaline degeneration with an increase in the connective-tissue element principally affecting the intima. The perivascular spaces are enlarged. Aside from the change in the vessels, the condition closely resembles a subacute interstitial neuritis, such as is found resulting from meningitis, brain tumor, etc. The subvaginal space is free, clearly indicating that the change is essen-

tially an intrinsic neuritis, an inflammatory condition not caused by any virus communicated through the subvaginal space. There can be no doubt that the vision would have been greatly and permanently impaired in this case had the patient lived long after the acute attack.

CASE No. 5.—Male adult. Death from chronic interstitial nephritis.

Ophthalmoscopic examination: Œdema of disc and neighboring retina; a few small, scattered hemorrhages; some diffuse whitish patches in the temporal side of the disc, apparently being due to exudation into the nerve-fibre layer.



Fgi. 3.

TRANSVERSE SECTION OF THE NERVE.—CASE NO. IV.

a, artery; *b*, vein.

Connective-tissue trabeculæ much thickened; nerve bundles reduced in size.

Globe secured 20 minutes after death. On macroscopical examination all parts appear to be normal except the retina, which shows a few very small hemorrhages and some small grayish patches at the fundus. Disc grayish in appearance.

Microscopical examination: The changes noticed are confined to the disc, nerve-fibre and ganglion-cell layers, and consist in some localized deposits of fibrinous exuda-

tion, a few small hemorrhages most numerous near the disc, some changes in the walls of the arteries, and a general œdema. The changes in the arteries consist in a slightly marked hyaline degeneration of the intima and a great distention of the perivascular spaces. An enlargement of the ganglion cells by imbibition is the change noted in that layer.

CASE No. 6.—This specimen of albuminuric retinitis I obtained through the kindness of Dr. Uhthoff, of Berlin.

Excepting the fact that the fundus gave quite a typical picture of albuminuric retinitis before death, I know nothing of the previous history. Only the posterior portion of the globe was received. A slight elevation at the disc was all that appeared to be abnormal on macroscopical examination.

Microscopical examination: The retina presents the appearance of a moderate œdema of the nerve-fibre layer with small hemorrhages in the vicinity of the disc and macula lutea. The red blood corpuscles are not confined to the nerve-fibre layer, but are found in the deeper parts of the retina, particularly near the disc. Spaces exist in the deeper parts of the retina which are filled with fibrine, coagulated albumen, and red blood corpuscles, an exudation similar to that described in Case No. 1. In the periphery the retina is normal in appearance.

Papillitis is marked, the elevation reaching 1 *mm* in height. Some new-formed capillary vessels are seen in the tissue of the disc; there is also a moderate increase in nuclei. The elevation is principally due to an œdematous swelling, there being little if any hyperplasia of connective tissue. Changes in the walls of the blood-vessels in the retina are slight. The hyaline degeneration of the intima of the arterial walls occurs to a slight degree. A marked enlargement of the perivascular spaces is seen in all parts of the retina. The great peculiarity in this case is the marked change in the choroid. Extensive hemorrhages are present, being most plentiful in the region of the disc and of the macula. In some parts the membrane is distended

and its whole thickness is occupied by a mass of red blood corpuscles. Hyaline degeneration of the walls of the vessels, arteries and veins, has reached a high degree, the lumen of many small arteries being obliterated. The change in the veins is not so extensive; many remain unaffected. The veins as a rule are engorged with blood. So far as can be determined, the escaped blood does not pass beyond the choroid; it does not form isolated clots, but infiltrates the tissue. In some places globular bodies are seen which are attached to the lamina vitrea. These project into the chorio-capillaris and occlude the capillaries at these points. Obliteration of the capillaries in the chorio-capillaris is also to be seen in other parts, due to hyperplasia of connective tissue and to a hyaline degeneration which has converted them into hyaline cylinders. The connective tissue of the choroid is not much increased, nor is there any appreciable change in the pigment cells of the choroid or retina.

Transverse sections of the optic nerve show marked hyaline degeneration of the walls of the artery. The nerve bundles are of normal size, and there is no evidence of degeneration of nerve fibres.

The description of one other eyeball might be given, but since it shows only a marked œdema of the nerve-fibre layer at and near the disc, and gives no new feature for this paper, it will pass with this notice only.

From the above reports of eyes examined microscopically, it becomes very evident that changes accompanying albuminuria may affect all parts of the eye, except possibly the fibrous tunic, the retina usually being the part most profoundly changed.

Vision may be but slightly or not at all diminished, or, as in Case No. 1, it may be entirely lost. Fürst[1] mentions having seen a few cases of absolute blindness following the albuminuria of pregnancy, the patient having recovered from the kidney disease. One case has come under my notice in which atrophy of the optic nerves was well advanced seven weeks after confinement. V$\frac{1}{\infty}$ in both eyes. The failure in vision was first noticed very shortly before

[1] *Berl. Klin. Wochenschr.*, 1887.

confinement and had steadily increased. There was a mild papillitis and numerous white plaques, but no hemorrhages. The urine contained some albumen, and there was an unmistakable history of marked albuminuria of pregnancy.

Monocular albuminuric retinitis has been observed and reported, but the belief is very prevalent that sooner or later the second eye will become affected. Cheatham[1] reports two cases of monocular albuminuric retinitis. One of the patients, in whom the left eye was affected, died, and autopsy showed the left kidney only to be diseased. In the second case albumen and casts were present in the urine. V = $\frac{20}{\frac{2}{0}}$ R; V = o L. After five weeks of treatment, V = $\frac{20}{30}$ R; V = $\frac{20}{40}$ L. Bull[2] mentions ten cases where one eye only was affected, but lays no particular stress on the fact, seeming to think that the second eye would not escape.

Case No. 1, reported somewhat at length, appears to be a very good illustration of monocular albuminuric retinitis, and is unique as regards the development of secondary glaucoma. I am not aware that the literature of albuminuric retinitis presents a parallel case. The decrease in tension which first obtained was followed by an increase accompanied by pain and total loss of sight. The eye was removed on account of the pain which it caused. Eighteen months have elapsed, still the left eye remains normal, although albumen and casts are present in the urine.

Regarding the anatomical changes affecting the eye in albuminuria, it is safe to say that there is but little inflammatory action involved; there is but little infiltration of leucocytes and increase of nuclei, and very little hyperplasia of connective tissue, such as we would expect to find in so chronic a condition if true inflammation were present. Extravascular, the condition usually is simply one of the escape of the elements of the blood from the vessels,—in mild cases the watery portion producing simple œdema; in severer cases all the elements of the blood leading to such marked changes as are found in Case No. 1. The escape of

[1] *Jour. Am. Med. Assoc.*, 1885, 5, p. 150.
[2] *N. Y. Med. Jour.*, July 31, 1886.

the elements of the blood from the vessels must of course be due to some influence that weakens their walls, an impairment in their nutrition. This may be produced by a change in the chemical composition of the blood, or by a diminution in the supply by obstruction, etc., or both conditions may obtain at the same time.

Complete restoration of vision occurs in many of the milder cases when the kidney disease is recovered from, as in the albuminuria of pregnancy, because of the complete absorption of the exudation. When large hemorrhages occur, and in the exceptional cases where there is a large increase in the connective tissue, etc., full restoration of vision cannot occur and absolute blindness may result.

An interesting feature in albuminuric retinitis is the relatively great size obtained by the ganglion cells, brought about by imbibition,—a part of the general œdema. No marked pathological change is present in them, except very slight granular degeneration of isolated groups.

Granular or fatty degeneration of Müller's fibres, as mentioned by Carl Theodore and Leber, has not been observed in the cases above reported. It is very probable that this is a post-mortem change, the time usually elapsing between the death of the person and the placing of the globe in Müller's fluid being sufficiently long to permit this change to occur.

It is conceded by most writers that the hemorrhages in retinitis take place from the veins and capillaries. When arterial stenosis is present the manner of its production is probably something as described by Knapp[1] in the report of his case of amyloid degeneration of the choroidal arteries. He says: "The force of the current, already greatly diminished by the resistance in the degenerated arteries, was now distributed over the immense space of the capillaries and veins of the choroid by which it must have been reduced almost to a minimum. Stagnation was the immediate consequence. Stagnating blood must soon lose its nutritive power, on account of which the walls of the vessels become diseased, softened, and frail. If now in some veins stasis by coagulation or over-distention takes

[1] ARCH. OF OPH. AND OTOL., vol. iii., No. 2, p. 115.

place, and the corresponding arteries continue to pour in even never so little blood, a rupture in the capillaries, the weakest link in the chain, must take place." Loss of the *vis a tergo.* This condition is also represented when embolism or thrombosis of the arteria retinæ centralis occurs; also in cases of great loss of blood from the system, as in *post-partum* hemorrhages.

Leber denies the occurrence of hyperplasia of retinal pigment in the retinitis accompanying albuminuria. Case No. 1 of the above series shows a condition of hyperplasia of retinal pigment very beautifully.

Hyaline nodules, formations on the lamina vitrea of the choroid are frequently met with in old people when no other diseased condition exists in the eye. They are well marked in Case No. 5. What influence the albuminuria had in producing them cannot be determined.

The detachment of the retina which is sometimes observed in retinitis accompanying albuminuria is due to the presence of the exudation beneath the retina. In Case No. 1 the exudation is found between the membrana limitans externa and the retinal pigment, and evidently proceeded from the retinal vessels. See Fig. 1, *d.*

The extensive choroidal changes observed in Case No. 5 shows that the degeneration in the arteries develops irregularly, and may be even more marked in the choroid than in the retina.

In the study of albuminuric retinitis, it becomes apparent that, in regard to their etiology, two classes of retinal disease are included in the present acceptance of the term. One depends almost entirely on the condition of the blood brought about by an acute disease of the kidneys, the kidney symptoms preceding the change in the retina; the other depending on a general (systemic) diseased condition of the arteries, capillaries, and, to a less extent, the veins, in which the ocular changes and symptoms may and not infrequently do precede the kidney symptoms (Stewart,[1] Mahomed,[2] Schuchardt,[3] Lemcke[4]). To the first belongs the

[1] Trans. Int. Med. Cong., Lond., vol. ii., p. 109, 1887.
[2] *Idem*, p. 114.
[3] *Berl. klin. Woch.*, p. 41, 1882.
[4] *Deutsch. Arch. f. klin. Med.*, vol. xxxv.

retinitis of pregnancy, scarlet-fever, diphtheria, etc., and all forms of acute diffuse nephritis, forms usually accompanied with general anasarca. In these cases the œdema and white plaques are the first evidence; hemorrhages, more or less numerous, often follow. To the second class belong the cases in which the first retinal change is a hemorrhage or a few small hemorrhages, usually in the vicinity of the macula. The œdema and white plaques (which represent coagulable exudation and its subsequent changes) appear later. Contemporary with, preceding or following the hemorrhages in the retina, we may find evidences of capillary hemorrhages in other parts of the system (Lemcke[1] and others), as in the cord, brain, from mucous membranes, etc. Anasarca is seldom a very marked condition in this form of disease. The first may be termed an irritation-nephritis, due to the effect of a morbific element on the kidney tissue, in which the kidney usually becomes enlarged, and the circulation interfered with by pressure on the vessels from the swollen tissue. The latter, a strangulation-nephritis, in which the blood supply is cut off by arterial stenosis, the kidney being always found contracted, and in which the morbific element contained in the blood causes a thickening and degeneration of the walls of the vessels with a diminution of their lumen. Both conditions may exist at the same time in varying degrees.

A large percentage of the cases of retinitis accompanying albuminuria undoubtedly belong to the latter category. An excellent example of this condition is presented in the case reported by Lemcke in the article referred to above. The patient was forty years of age, and when first seen presented briefly the following conditions: Hypertrophy of left side of heart, slight œdema at joints in lower extremities, urine a little less than normal in amount, no albumen. Ophthalmoscopic examination showed retinal hemorrhages not numerous, a very few white plaques in the retina, veins tortuous and engorged, arteries diminished in size, disc hazy at margins, $V = \frac{20}{20}$.

The patient was under direct observation about two years

[1] *Deutsch. Arch. f. klin. Med.*, vol. xxxv.

and a half. Albumen became very plentiful at the end of one year, continued so for some months, and then became much less in quantity. At about this time petechiæ were noticed on the extremities. Skin became dry and discolored, patient emaciated. Hypertrophy of left ventricle increased. More hemorrhages in the retina. Vision but little impaired. On microscopic examination, post mortem, the walls of the arteries, arterioles, and capillaries in all parts of the body were found to be greatly thickened, the process affecting the intima principally. Heart hypertrophied. Kidneys shrunken.

The changes in the vessels are referred to by Ziegler[1] (changes observed in the kidneys) as hyaline degeneration of the intima, and arterio-sclerosis, Gall and Sutton[2] (observed in cord and brain) as arterio-capillary fibrosis and hyalofibrosis, Carl Theodore[3] (observed in retina, choroid, iris, etc.) as hyaline thickening of the intima; Meigs[4] (observed in larger arteries and veins) as fibrous thickening of the intima. Ziegler described it as affecting the intima and muscularis, Gall and Sutton as affecting the intima, muscularis, and adventitia, Carl Theodore and Meigs as affecting the intima. The condition is evidently termed amyloid degeneration by many of the older writers (Currie and Ranvier, Green, Rindfleisch, etc.), but the amyloid reaction with iodine and sulphuric acid cannot be demonstrated in all of the cases. That the material is albuminous in nature is conceded, I think, by all. Litten,[5] in an investigation of eleven cases of hyaline degeneration in the walls of the arteries in the kidneys, points out the relation existing between hyaline and amyloid material, and considers them to be different stages of the same process. No amyloid reaction could be obtained in the reported cases above. In regard to the formation of the hyaline material, Carl Theodore is of the opinion that the substance is produced by a transudation of white blood corpuscles through the intima of the vessel,

[1] "Path. Anat."
[2] Trans. Path. Soc., London, vol. xxviii., 1877.
[3] "Zur Path. Anat. des Auges," Wiesbaden, 1887.
[4] *N. Y. Med. Record*, July 7, 1888.
[5] *Deutsch. med. Woch.*, p. 517, 1887.

where they lodge, and from perverted nutrition gradually lose their outlines and become converted into a hyaline mass. This is conjecture only. There does not appear to be any satisfactory or positive explanation of the development of this substance.

Cases illustrating the pre-albuminuric stage of retinitis have been observed by many ophthalmologists. Gand [1] reports thirteen cases. Delalande [1] reports twenty-three cases accompanying atheromatous degeneration of the arteries, with and without albuminuria. Trousseau [1] reports three cases.

[1] *Sajous, Annual*, vol. iii., Phila., 1888.

A CASE WITH HIGH DEGREE OF ASTIGMATISM AFTER CATARACT EXTRACTION IMPROVED BY OPERATION.

By Dr. HJ. SCHIÖTZ, Christiania.

A. S., mason, 33 years old, was admitted on November 20, 1882, to the ophthalmic division of the State Hospital, with cataracta zonularis of both eyes. On the left eye an iridectomy upward was performed, and the lens extracted after being rendered completely opaque by several incisions. A part of the lens remained, however, in the anterior chamber. During the healing process, which progressed without any symptoms of irritation, a piece of the lens mass came to lie against the inner side of the wound in such a way as to push the corneal flaps forward. This was undoubtedly the principal cause of a considerable alteration in the corneal curvature that showed itself, and even persisted when the lens mass was entirely absorbed and the eye in other respects was normal.

The ophthalmometric measurements hereafter given have been obtained with the Javal-Schiötz instrument.

Before the operation, the examination showed :

$$0^\circ + 1 ; 90^\circ + 0.6.$$

(The figures to the left of the semicolon are for the left eye; those to the right for the right eye. The degrees give the position of the meridian of maximum refraction ; 0° indicates the vertical meridian, and from this the degrees are numbered towards the patient's right, 15°, 30°, etc. The figures with the symbol + indicate the difference between the two principal meridians of the cornea, expressed in dioptries.)

The left eye accordingly showed a corneal astigmatism of 1 dioptrie, the vertical meridian being that of maximum refraction. The radius of curvature for the cornea in the meridian of weakest

refraction was 8.26 *mm*, in the meridian of maximum refraction 8.16 *mm*.

About four months after the extraction, the examination with ophthalmometer and optometer gave the following results :

$$83^\circ + 19.5 \ ;$$
$$85^\circ + 8 + 6 \ ;$$
$$\text{Visus, } \tfrac{20}{100} \ ;$$

i. e. a corneal astigmatism of 19.5 dioptries.

With Javal's optometer, the strongest cylinder of which is only 8 D, the best combination found was that of a convex cylinder of 8 D, with a spherical glass + 6 D, the axis of maximum refraction being 85°. A more exact correction of the astigmatism by means of a combination of two cylindrical glasses was attempted ; the patient preferred, however, the above combination. The discomfort caused by the use of the stronger cylindrical combination outweighed the advantage of a more exact correction. It deserves attention, however, that the visual acuteness reached $\frac{20}{100}$ in spite of the high degree of astigmatism remaining uncorrected.

One sees easily on examining the cornea, that it forms an upright ellipse, the upper part of which, corresponding to the scar, bulges forward. On keratoscopic examination with the Javal disc, the picture was a pretty regular, upright ellipse, with vertical axis twice as long as the horizontal. The corneal radius in the meridian of maximum refraction was 9.852 *mm*, in that of minimum refraction, 6.366 *mm*.

The patient was again examined on January 30, 1884, about one year after the operation. The appearance of the cornea was unchanged, and the ophthalmometric examination gave the same result (19.7 dioptries corneal astigmatism).

He was again admitted to the hospital, on Februaiy 1, 1884, in order to have the iridectomy, discisiion, and extraction of the zonular cataract on the right eye done. Meanwhile, however, the attempt was first made to improve the curvature of the left cornea by an operative procedure.

On February 12th an incision upwards was made with a Graefe knife through the base of the most bulging part, and a small flap cut away with the Wecker scissors after the wound had healed without any trace of reaction, the patient was again examined on February 27 ; there was no change noticed from the results of the previous examinations, the degree of the astigmatism and the radii of corneal curvature remaining the same.

The operation was repeated on March 1st, essentially in the same manner as before. An attempt was however made to cut a small flap from the upper lip of the wound.

On March 13th the corneal astigmatism, as determined by the ophthalmometer, was 15.75 D, the radii of curvature 9.17 *mm* and 6.49 *mm*, showing a diminution of 3.75 dioptries in the astigmatism.

The patient was again operated on March 22d. The operation was this time confined to an incision with the Graefe knife. It was made upwards and inwards (this latter because the cicatrix bulged here considerably), and in such a way that the incision made an obtuse angle with the direction of the corneal section in the original cataract-extraction. This cut was carried through the inner part of the cicatrix, and also the adjoining inner corneal border, a distance of about 3.5 *mm*. After the wound had healed, the astigmatism was found on March 31st reduced to 11.29 dioptries.

$$110^\circ \pm 11.29;$$
$$105^\circ + 6 + 8;$$
$$V = \tfrac{8}{16}$$

The corneal radii were 8.688 and 6.78 *mm*. On repeating the examination April 22d, a progressive diminution of the astigmatism was observed, the results being:

$$105^\circ \pm 9.5;$$
$$100^\circ + 6 + 9;$$
$$V = \tfrac{8}{15}$$

Finally, on Aug. 12th, the ophthalmometric examination resulted as follows:

$$100^\circ + 7;$$
$$100^\circ + 5 + 11;$$
$$V = \tfrac{8}{16}$$

The corneal radii were now 8.75 *mm* and 7.45 *mm*. A later examination on November 25th gave the same results.

This case seems to me worthy of attention, not only as an example of the marked and permanent alterations of curvature which may occasionally present themselves in the cornea, but above all on account of the favorable results upon the altered curvature, which were obtained by operative procedure. The astigmatism was reduced from 19.5 dioptries to 7. After operations such as iridectomy, and particularly cataract-extraction, a not inconsiderable degree of astigmatism is wont to show, but

this in almost all cases disappears in the course of a couple of months, either completely or at least (and this is the most common result) to such an extent that at most a difference of 2 dioptries remains. Where, however, some lens matter remains in the eye and comes to lie near the corneal wound in such a way that on swelling it pushes forward the anterior lip of the wound, or where other conditions tend to the production of a cystoid scar, alterations of curvature must develop, and of a kind that do not disappear spontaneously. As far as I know, the case here reported is the first in which astigmatism has given the indication for an operation.

In this connection we feel justified in holding that the partial excision of the cicatrix proper exerted only a proportionally trifling effect on the curvature of the cornea; on the other hand, the division of the normal parts adjoining the cicatrix, by an incision making an obtuse angle with the original corneal incision, proved specially efficacious. This was, however, to be expected, as the abnormal corneal curvature must be most marked immediately on either side of the bulging scar.

Congenital corneal astigmatism will scarcely ever afford an indication for operative interference, as, so far as I know, it never exceeds 6–7 dioptries, with a limit of 8 dioptries for the total astigmatism.

CLINICAL MISCELLANIES.

By Dr. I. GROSSMANN, of Buda-Pest.

Translated by Dr. J. A. Spalding, Portland, Me.

I.—*A contribution to skin- and mucous-grafting.*

REVERDIN'S operation and its modifications have proved so valuable in general surgery, that ophthalmic surgeons have resorted to grafts of skin without a flap instead of the old flap operations for restoring the lids, etc. The results have generally been good.

Many authors are asserted to have tried the plan previous to Wolfe, so that the question of priority is still undecided. Wecker amongst others has done "mosaic" grafting with some success, whilst irregular transplantation of small bits of skin has been repeatedly employed. We learn, too, from Bock's monograph, that Stellwag modified Reverdin's method as far back as 1878 by using bits of mucous membrane, and that he expressed the opinion that the danger of losing the flap from suppuration was greater with a pedicle, than in simple transplantation. "But," adds Bock, "if we do not succeed in healing by first intention the plastic operation is rendered hopeless, and in many cases the chance for a second operation destroyed owing to the almost total loss of skin in the neighborhood."

"If, on the contrary, transplanted skin dies, recovery may be delayed, but the injury can again be made good. For even if the patient cannot furnish the skin we can get it from others, or even from the corpses of those who may not have died of contagious diseases."

Bock's tables show that 97 operations were performed at Stellwag's clinique, the material being taken chiefly from the upper arm, twice from an amputated stump, and once from over the lower rib. All but eight of the operations were successful, permitting free motion of the eye.

Thirty-three cases of mucous grafting are also appended, 26 being done with rabbit's conjunctiva, and the rest with mucous membrane from various parts of the body. Of these, 27 were successful.

I now add the following case :

May 16, 1884. J. F., a laborer, æt. 62 ; mature cataract R. E., immature, L. E. He first noticed three years ago in the inner angle of the left eye a hard nodule which gradually expanded into an open ulcer.

The lower lid has an ulcer 3 *cm* long, and 1 broad, covered with crust and a thin secretion. The canthus is occupied with a similar ulcer, extending upon the nose. The case was diagnosticated as carcinoma, and the operation done May 19th.

The disease was eradicated to the bone with knife and scissors, and the abundant hemorrhage checked by ligating the vessels. The bleeding surface was covered with cloths dipped in iced-water. I next removed from over the biceps a flap of skin a third larger in every direction than the space to be covered, and cleansed it of fat and connective tissue.

The bleeding continued so abundant, that the transplantation was postponed to the following day, the flap being kept in cloths moistened with boric solution, and the arm sutured and bandaged.

On the next day the graft was cut into eight pieces, which were fitted as neatly as possible to the prepared surface and held in place with oiled silk and a bandage.

Three days later the lid was uncovered and found in a healthy condition, with slight secretion, and a few bits of softened epidermis.

By the 8th of June, a perfect covering had been obtained for the eye.

June 10th, cataract extraction R. E.; incision downward, small iridectomy, and no accident. Final S $\frac{20}{30}$, and a neatly shaped left lower eyelid.

2.—*Partial symblepharon of the left lower eyelid.*

Mrs. S., æt. 52, came for partial loss of mobility of the left eye. Examination of the right eye also shows a defect ; three deli-

cate strands of conjunctiva at the extreme lower fold extend from the lid to the globe.

Lower lid of left eye everted, and a bridle of connective tissue 6 *mm* wide extends from just within the inner margin of the lid to the conjunctiva 2 *mm* beneath the cornea. The conjunctival surface from the cornea to the spot where the connective tissue united with the globe is white and shiny as if it had been touched with a silver-nitrate pencil. But there is no secretion. The patient cannot look down, owing to an adhesion between the upper lid and conjunctiva. Vision normal, slight Hm.

The symblepharon had been caused by a mixture of pepper and sugar blown into the eye by order of a charlatan. This irritating substance probably excited inflammation and loss of tissue with subsequent granulation and union of the opposite surfaces. The band of overlying tissue is probably xerosis, due perchance to imperfect closure of the lids.

The shiny deposit on the cornea was shaved off under cocaine, but unfortunately lost. All remaining adhesions of the left upper lid were divided with the scissors as far as the fold, and the loss supplied by an oval piece of vaginal mucous membrane. Both eyes were then closed. By the third day the mucous flap had united.

Three days later the left lower lid was freed in a similar way, and the loss supplied by vaginal mucous membrane cleansed with boric solution. Furthermore the large space in the fold was filled in with a mucous graft held in place by a suture running through the lid, and supported by a small roller on the cheek outside.

The patient was sent home in a week with satisfactory result: the eye rotated freely in all directions, the conjunctival wound seemed entirely covered with epithelium, and the conjunctival fold was restored. The middle of the lid had resumed its normal position, and the conjunctival surface glistened normally.

3.—*Sixfold paralysis of the left cerebral nerves.*

A. Z., æt. 44, has always been delicate; menstruation generally accompanied with cramps in the legs. At the age of 20 she had a child that lived but twenty days, dying from "weakness."

January 18, 1885.—Diplopia, vertigo, deafness, and tinnitus in the left ear.

Right eye moves normally in every direction; left pupil smaller than the right on convergence, but reaction and accommodation are normal in each eye. On covering the right eye, the left fixes

with difficulty; and the right converges by association, but the left can then hardly move to the sagittal line. It is therefore deficient in lateral motion. With increased impulse of the will it merely moves zig-zag outward and upward, or outward and downward. On looking straight ahead, and holding the object in the median line, the left eye deviates inward before the right visual line reaches the sagittal plane. This is more marked when the object is held to the left (pathological divergence). The object is single in the right field of fixation, but horizontally to the left diplopia ensues. The double images are parallel and on the same level, but the farther to the left the object is moved the greater the lateral distance of the images.

In intermediate positions to the left, the images differ in height and obliquity. The image is projected to the left, and the patient grasps at it still farther to the left, vertigo ensues, and the head is involuntarily turned to the right, so that the image may fall into the right half of the field.

Diagnosis: *Left abducens paralysis.*

Myopia slight, with downward conus.

The lips sag to the right; uvula normal, left lagophthalmus.

Left membrana tympani opaque, light spot faint. Tuning-fork, 2½ *cm* left ear, 50 *cm* right ear. Bone-conduction best in right ear; watch 0 left ear, 85 *cm* right. The consonants C, P, F, and W barely perceived; left ear at 1 *cm*. Hearing not improved by catheterization. Roaring and rushing in the ears at night; patient thus made sleepless; syphilis denied.

Patient declined to stay in the hospital, but was brought back in a short time on account of a profuse epistaxis, resulting in extreme prostration. I saw her again in March.

Left forehead anæsthetic, lagophthalmus more noticeable, and the left eye rotated up under upper lid. Abducens paralysis as before, cornea insensible to the touch, mouth distorted, left half of face and lips anæsthetic, and smell in the left nostril lost except for strong aqua ammonia.

Bone-conduction for the deep C fork only; c^4 and f sharp^4 very faintly perceived.

Stuttering and slowness of speech; tip of tongue directed to left; no taste on left anterior portion of tongue, but perfect taste on opposite side.

Difficulty of deglutition, weakness in left extremities, loss of

grasp in left hand, and inability to stand on the feet, the inner surfaces of which are very insensible. No vomiting or vertigo, mind clear, no albumen or sugar in urine.

The history shows paralysis of the abducens, then of the facial, including its upper branches.

The sound-perceiving apparatus appeared diseased because the drum membrane was nearly normal, and the deafness was not relieved by catheterization. The results of the tuning-fork tests for bone-conduction pointed the same way.

The trigeminus was paralyzed in both motor and sensitive branches, as shown by the behavior of the masseter muscles, and the anæsthesia of the left half of the forehead and face, as well as of the cornea and conjunctiva of the left eye. The left-sided anosmia was partly due to trigeminal anæsthesia, and partly to facial paralysis, but the olfactory nerve may also have been paralyzed.

The dysphagia indicated glosso-pharyngeal paralysis, although the same disease in the hypoglossus may have contributed to the difficulty, for the facial innervates this function by branching to the styloglossus, stylohyoideus, and digastricus, and the hypoglossus regulates the motion of the tongue.

The poor articulation betrayed hypoglossal paresis.

The lack of taste arose partly from anæsthesia of the lingual branch of the trigeminus, and partly from disease of the glosso-pharyngeus.

There must have been a lesion at the base of the brain to excite so extensive a paralysis of the 5th, 6th, 7th, 8th, 9th, and 12th pairs, or if within the brain, at the pons Varolii. According to Nothnagel ("Topische Diagnostik der Gehirnkrankheiten"): "Paralysis of the motor and sensitive nerves is more frequent than irritation of the same in diseases of the pons, which are characterized by alternating paralyses. The latter chiefly attack the motor and sensitive nerves on the opposite side, whilst the cerebral motor nerves, *e. g.*, the trigeminus, abducens, facial, etc., are generally paralyzed on the same side with the morbid focus."

"Simultaneous affection of cerebral motor nerves and

those of the extremities is most generally noticed. We rarely see a paralysis limited to the motor cerebral nerves in an affection of the pons."

The only support for such a disease in my case was cerebral motor nerve paralysis. Yet the absence of alternating paralysis of the extremities rendered this diagnosis doubtful. Nevertheless, after learning (Nothnagel) that this spmptom was not essential, I clung to a disease of the pons.

Other symptoms favoring this diagnosis were paralysis of the facial and abducens, the excessive trigeminal anæsthesia with anæsthesia of the left extremities, and finally the dysphagia and paralysis of the hypoglossus as manifested in the disturbance of articulation and defective motion of the tongue. The bulb of the medulla may also have participated in the lesion, since the nerves which govern the motion of swallowing originate there. Moreover, neither mind nor consciousness was at all affected, and the faradic excitability of the facial was lost and galvanic irritation but slightly perceived, whilst, on the contrary, increased galvano-muscular contractility was visible after direct galvano-muscular irritation.

Finally, we had to consider the altered function of the nerve of hearing, for although affections of the organs of sense are not important symptoms in diseases of the pons, yet Nothnagel hints that we should not forget unilateral deafness in making up our diagnosis.

This patient could not have been paralyzed by hemorrhage within the pons, or from a softened focus, for the former kills the patient quicker than a cerebral hemorrhage, and if the patient survives, epileptiform spasms (absent here) are more frequent, and for the reason that the reflex centre for convulsions lies in the pons. Hemorrhage from a softened focus could be excluded, because such an occurrence can only be relied upon for a diagnosis several weeks after the injury (8 to 12).

There was nothing to indicate a stationary encapsulated abscess.

The history seemed to indicate syphilitic gummous periostitis at the base of the brain, terminating in pressure on

the basal surface of the pons. That the pressure existed there, and not elsewhere, was proved by loss of function of the motor tracts, which lie nearer the basal than the dorsal surface of the pons.

Potassic iodide, 1 grm. daily. In ten days dysphagia began to yield, and in ten more, after increasing the iodide, it had disappeared. The tongue also moved more rapidly, and the eye could be voluntarily rotated beyond the sagittal line.

The rapid improvement sustained the diagnosis of syphilis and gumma, because in brain diseases there could not have been such rapid amelioration.

The iodide was pushed to 4 grm. daily, and on alternate days galvanism was tried. The patient improved slowly but constantly, and on the eighty-fourth day left the hospital against my wishes, improved, though not cured, in the following condition :

Extremities stronger ; sensibility normal ; no facial anæsthesia or lagophthalmus ; left eye mobile ; pupil smaller than right ; diplopia only on extreme abduction to the left ; masseter muscles normal ; tongue projects a little to the left ; hearing increased in left ear to 4 *m*, whilst the c^4 and f sharp^4 forks are not so distinctly heard by bone-conduction in the left ear as before.

A fortnight later she brought a piece of bone 23 *mm* long, 17 high, and 12 wide, coughed up the day before. It was porous, necrotic, and ragged. Rhinoscopy showed that it had been exfoliated from the root of the left pterygoid process. It was probably due to ostitis gummosa, concerning which Zeiss says :

"Gummata may originate from the embryonal connective tissue formed within the medullary space."

And Virchow remarks :

"The peculiarity of necrosis of the skull in the course of constitutional syphilis argues in favor of the gummous form, because the necrosis generally extends from within outward. The dying bone, coarse, porous, and apparently worm-eaten, loosens itself from the living bone by a more or less zig-zag line of demarcation."

"Such foci are often numerous, sometimes separate, and sometimes adjoining, and in the latter case becoming confluent and producing great destruction."

After this sequestrum was exfoliated the ocular paralysis and diplopia disappeared, the masseters became normal in action, and the mouth mobile. The anosmia was still present, indicating that the olfactory nerve at the base of the brain was still subjected to pressure.

On returning from my vacation in August, I was informed that the patient died July 31st, after a profuse epistaxis on the previous day, and that an autopsy had been refused.

Remarks.

1. The effect of the administration of the iodide seems to justify my belief that the lesion in the pons depended on bone disease at the base of the skull, because so rapid an improvement would not have been seen if the disease had been intracerebral.

2. The sequestrum, which was apparently due to ostitis syphilitica, proves that a gumma can originate from the embryonal connective tissue in the medullary space as well as under the periosteum.

3. The patient died from the sudden and enormous loss of blood. From the manner in which it is said to have gushed from the nostrils, it is plain that some great artery, either the carotid or basilary, must have burst from erosion, whilst the earlier attacks of epistaxis resulted from the rupture of smaller vessels.

4. Finally, we are to remark that, although the paralysis decreased and the general health improved, yet the bone disease continued to progress, and at last terminated life by eroding an artery.

A CASE OF DYSLEXIA (DYSANAGNOSIA, LESE-SCHEU) WITH AUTOPSY.

By Dr. A. NIEDEN, Bochum.

Translated by Dr. Wilmer, New York.

In the literature of ophthalmology, as well as in that of neuropathology, we find the above symptomatic term as an addition of a very recent date. Berlin[1] was the first, from his observation of five cases, to draw attention to this symptom at the Congress of German neurologists in 1883. He recognized this as an early and characteristic symptom of certain cerebral affections, as well as an important factor in its bearing upon the prognosis of the case.

The term "dyslexia," as used by him, signifies an inability to read to one's self or aloud for a short time—*i. e.*, not more than four or five words. There is no blurring nor swimming of the letters and words; no pain in the eyes or head, but simply, as Berlin correctly designates it, a disinclination, as if it were impossible to make the necessary mental effort.

The disturbance generally makes its appearance suddenly, and is the first symptom that points to disease of the brain.

Besides headache and dizziness this symptom was always followed by other evidences of a cerebral affection. In the reported cases aphasia occurred twice; right-sided hemianopsia once; disturbance in the movements of the tongue twice; right-sided paræsthesia twice; hemiplegia twice

[1] Prof. Dr. R. Berlin: Ueber Dyslexie. Vortrag auf der Versammlung Südwestdeutscher Neurol. und Irrenärzte am 17. Juni, 1883. *Baden-Baden, und Med. Corresp.-Blatt. d. Würtemb. ärztl. Landes-Versamml.*, 1883, No. 27.

(being right-sided in one case); and clonic contractions of the facial muscles of the right side once.

All of Berlin's cases, now six,[1] ended fatally after a longer or shorter duration of the disease. Four of the patients were males and two females, and their ages varied from 30 to 72 years.

The above-shown frequency with which the hemiplegia, paræsthesia, and spasms of the facial muscles occur on the right side, would lead one to suspect a lesion of the left hemisphere, especially that part of the cortex between Broca's frontal convolution, the facial centre, and the central convolutions.

Berlin was lately able to confirm by autopsy his view, which he advanced five years ago, regarding the probable seat of the pathological changes giving rise to the above-mentioned symptom.

But it is only when the ophthalmologist has excluded all other similar symptoms, generally grouped under the term hebetudo visus, that the neurologist can use this decidedly important initial symptom of cerebral disease.

So the knowledge of this affection is important and interesting to members of these specialties, and serves as a bond to unite still more closely those branches that are already so intimately connected.

I hope by reporting a similar case not only to enrich the literature of the subject which is still scant, but also to convince my fellow-specialists of the necessity of being familiar with the appearances of this disease.

On July 12th, of this year, I was summoned to see a patient in consultation, who, for some weeks after a sudden eclamptic attack, had suffered from a great loss of strength, though apparently no single organ was at fault.

From the convulsive seizure which occurred in the course of the next week, and from the fact that the patient was no longer able to read continuously, the attending physicians suspected some cerebral trouble, and desired an ophthalmoscopic examination.

[1] Vortrag auf der XI. Versamml. Südwestdeutscher Neurol. und Irrenärzte am 22. und 23. Mai, in Baden-Baden. Cf. *Corresp.-Blatt. f. Nervenheilk.*, von Erlenmeyer, Bd. IX., S. 362.

I found a strongly-built man, 39 years of age, who was by vocation a painter and decorator. With the exception of a certain relaxation of body and features, he showed no outward sign of disease.

The following history was obtained: Early on the morning of June 22d the patient, having retired in perfect health and slept well, was found by his wife in severe convulsions, after making an attempt to look at his watch which was on the left side of the bed. He was unconscious, answered no questions, eyes were closed, the head was buried in the pillow, while the whole body was tossed to and fro so violently that it was impossible to hold him upon the bed. A preponderance of the spasms upon one side was not noticed, the breathing was labored and moaning, and the thumbs, to which the layman in this part of the country first directs his attention, were not bent in.

The attack lasted about 20 minutes, and was followed by a general relaxation of the body; consciousness returned, and the patient complained of great soreness in all the limbs. Severe headache and pain in the nape of the neck on the left side, which was increased by pressure upon a corresponding portion of the vertebral column. There was also a tender spot over the dorsal vertebræ and the epigastric region.

The feeling of weakness and the headache disappeared in the course of the next day, and in a short time he returned to his business.

June 28th, exactly 8 days after the first attack, there was a repetition, following an afternoon nap. Shortly after falling asleep, he was again found rolling about unconscious in bed.

Dr. Reinhard, his physician, arrived quickly and recognized an eclamptic attack. The spasms chiefly involved the upper extremities, seemingly to an equal degree on either side. The upper portion of the body was twisted around its long axis towards the left, while the head was pressed against the mattress. There was complete loss of consciousness; the pupils, under the closed lids, were contracted and immovable; the pulse was small, hard, but regular. There was no involuntary passage of urine and fæces; the tongue was uninjured.

After a duration of half an hour the spasms gradually ceased, consciousness returned and the patient complained more of headache and pain in the limbs than formerly. The loss of strength was more marked and the convalescence slower than after the first attack.

No pathological manifestations either in bodily or mental functions remained, except a tendency to syncopal attacks after violent exercise or when worried by business or domestic affairs. Appetite was good, sleep sound, and pulse normal (full and strong), though it had fallen from 76 or 78 to 60 beats a minute.

After a day or so, when the patient wished to read, it became unpleasantly noticeable that he was unable to direct his glance at the print for longer than a few seconds, or to recognize and read a few words, without feeling compelled to turn away his head.

The patient stated explicity that there was no blurring nor swimming of the letters when an attempt was made to read, but an unconquerable inclination to turn away the head, just as if his mental energy were exhausted by this slight effort.

The patient, a hypermetrope of moderate degree, wore constantly for years convex glasses (+ 1.25 D), and at first believed that his inability to read depended upon the unsuitableness of the correcting glasses. He changed his glasses from + 2.5 D down without any improvement.

Alarmed by this circumstance and owing to the desire of the attending physicians to learn the result of an ophthalmoscopic examination, the patient consulted me.

I found the motility of the eyes good and the reaction of the pupil normal (under the influence of light and in the act of accommodation and convergence). There was 1.0 D lat. H, the refracting media and fundus were normal, and there was apparently no hyperæsthesia of the retina during this brilliant illumination.

With the error of refraction corrected, V = $\frac{10}{10}$, and the single letters were deciphered rapidly and without difficulty. In testing the near vision, the patient read promptly and correctly the first four words of No. 1. (my scale), then with an expression of annoyance suddenly turned away from the book, declaring that he could read no further. Urged to make another attempt, he willingly did so, with the same result as before.

In the beginning of this peculiar condition the patient presents more of the symptoms so well known under the head of "asthenopia." There is merely a certain feeling of disinclination (or dread) to read further, which is shown in the whole attitude and behavior of the patient, and which is so characteristic that, being once seen, its peculiarity is never forgotten.

I was immediately impressed with its similarity to the first

stages of hydrophobia, when an attempt to drink is made. In both cases there is the same movement of dread and rapid turning aside of the head to repel that which was desired, and again an attempt is made to accomplish what has just proved futile.

In our case this inability to read remained, irrespective of the size and character of type used. I urged the patient to make an effort to read further for me, and with evident effort he read one or two words more.

This mental exertion was always followed by a sort of fainting attack, which set in of late more frequently. He sank back exhausted, complaining that he perceived a peculiar foul odor.

Patient was able to repeat words and sentences and to write from dictation without any difficulty. The other mental faculties, memory, etc., were intact, and the patient was just as much interested in his business as ever.

The visual fields were complete, and color perception good. During this test, which lasted about fifteen minutes, he showed only ordinary signs of fatigue, and there was manifested no inability to continue this mental exertion, as had been noticed in the attempt to read.

Being unacquainted with the literature of Berlin's report, the character of the visual disturbance remained doubtful to me. However, taking this in connection with the previous eclamptic attacks, I could but agree with the attending physicians, who considered the disturbances to be dependent upon some cerebral affection.

The further history did not throw any more light upon the subject. No history of hereditary trouble, previous illness, specific disease, or alcoholic excess could be obtained. Patient came from a healthy family, and was the father of three healthy children.

Fourteen years ago the patient had a sudden eclamptic attack, similar in all respects to the one just observed. This passed away with transient disturbance of consciousness, and left, with the exception of a tired feeling for twenty-four hours, no further ill effects.

During the last six months the patient's wife first noticed a change in his manner, which she attributed to anxiety concerning his business. He became rather restless, avoided his family, and his sleep was not sound and troubled with unpleasant dreams. The dreams were always connected with business matters, though his affairs were prosperous.

Though the patient was a painter, he had never suffered from lead poisoning—in fact he very seldom handled lead colors.

From these facts it was impossible to make an exact diagnosis, but I agreed with his physicians in ordering tonic treatment.

About the middle of July the patient felt so strong and well that he not only undertook long walks daily, but also mountain climbing, and after three weeks returned, apparently completely well. Only the inability to read remained.

Shortly after his return, on August 2d, an acute gastro-enteritis set in, without any assignable cause, and he was confined to bed. Patient complained much of headache, which extended over the whole skull, general uneasiness, and drowsiness. The intestinal catarrh passed away without the appearance of any other symptom. The fundus oculi and patellar reflex remained normal.

No attempts to read were now made, and mental effort seemed unpleasant to the patient, though he answered correctly all questions put to him. Memory and speech were still not impaired.

Patient now gradually sank into a soporous condition, in which he lay quiet, generally snoring. He participated but seldom in the general conversation, and questions regarding his business had no more interest for him. He complained of headache, which was not increased by pressure. There was no paralysis nor loss of sensation. The pupil of the left eye was somewhat dilated, but it reacted normally. Pulse was 60 and temperature 37.4.°

Revulsive treatment, seton in the back of the neck, and cold shower baths (the patient being still able to dress and undress himself) had no effect.

The soporous condition increased till August 15th, when the first symptom of paralysis showed itself in a retention of urine, rendering the introduction of a catheter necessary.

Even now during waking moments the patient's mental faculties were preserved; though he complained incessantly of headaches. There was still no change in the fundus oculi.

On the morning of August 18th paresis of the facial muscles and the extremities of the right side was noticed, while æsthesia remained intact in all parts of the body. By the next morning the functions of the facial muscles and those of the extremities were completely restored.

Speech was now sluggish and one had to call loudly in order to obtain any answer from the patient, though he invariably replied correctly. The tongue was projected symmetrically.

The patient slept almost continuously, and indicated by a frequent deep groan that he still suffered from headache. The respiration now and then exhibited Stokes' phonemenon. Although there was no difficulty in swallowing, the patient only took nourishment when it was put into his mouth. This condition continued for two days without any further symptoms of paralysis.

Death followed in the evening of August 21st, in deep sopor.

Autopsy was made 15 hours after death. The skull-cap was of normal thickness, and the dura mater was in one spot so adherent to the left parietal bone that it required some force to detach it.

There was no difference in the fulness of the blood-vessels of the two sides, and only moderate venous stasis.

The gyri were normally developed, and there was no flattening nor pathological change at the spot where the dura showed the chronic inflammatory process.

The brain substance was of normal consistency ; the left ventricle contained no great amount of fluid. The locus affectionis was indicated by a discoloration of the parts in and around the corpus striatum.

Upon making a section through this region, which, especially in its anterior portion, was in a condition of softening, it was found to be occupied by three apoplectic foci, each in a varying stage of transformation, according to date of origin.

The largest focus, about the size of a walnut, and situated in the anterior portion of the corpus striatum, was surrounded by a delicate sheath of connective tissue. All the white substance which extended anteriorly to the inferior frontal involution, was involved, the whole mass being in a state of yellow softening—almost liquid. No arrangement of the original histological elements could be recognized. The gray matter was not at all involved ; and the cortex overlying this focus presented no pronounced bulging nor depression.

The second focus, situated at the upper and posterior border of the first, was of smaller dimensions (about the size of the kernel of a hazel-nut), and its consistence and colors indicated a more recent origin. It was also surrounded by a well-marked capsule. Only the white substance of the corpus striatum was involved to any extent, though there was a bulging of the inner nuclear masses from lateral pressure, and the capsula interna was pushed downward and inward. The focus showed macro- and micro-

scopically the characteristics of red softening, and here and there in the mass were noticed single dark red spots of coagulated blood.

The third focus was evidently the most recent. It was about the size of a pea, occupied the middle of the nucleus lenticularis, and consisted of two fresh blood-clots which were under some pressure from the surrounding structures. The central portion of the nucleus was destroyed, and the surrounding tissues were œdematous.

The nucleus caudatus and the capsula interna were intact, with the exception of the displacement, though they had in general a somewhat reddish tinge.

The middle focus was traversed from below upward by a small dilated blood-vessel containing a thrombus. It was apparently a branch of the arteria lenticulo-striata, and could be peeled out of the softened mass like a solid structure.

The microscopical examination of the walls of this vessel, those of the choroidal plexus and one of the larger arterial trunks (carotid) showed no essentially pathological changes. Other parts of the brain (thalamus opticus, etc.) were normal, as were the right hemisphere and optic nerves.

Sections of other organs were not made; for repeated examinations had shown no lesion—not even in the heart.

To briefly summarize: we have a case of cerebral disease in a young and healthy individual, who, having lived under apparently normal conditions, and having been accustomed to bodily and mental activity, suddenly fell in an eclamptic attack while raising himself in bed after a good night's rest. The spasms having ceased, we next have a certain mental restlessness, which was first noticed during the last six months, and which could only be attributed to concern about business matters. Patient drank regularly, but with moderation.

This attack left behind no ill effects other than general weakness, soreness of limbs, headache, and certain tender spots over certain dorsal and cervical vertebræ. There was no failure of mental power.

Eight days later patient had another attack similar to the first, the spasms chiefly affecting the right upper extremity. It was now that the patient noticed his inability to read ir-

respective of the size and character of the type used. And whenever, as has been before mentioned, the patient made a mental effort, it was followed by a sort of syncopal attack preceded by a certain aura—a subjective sensation of smell. With this exception there was so far no symptom of cerebral disease.

Six weeks after the first attack the patient was much weakened by an acute gastro-intestinal catarrh. He was now drowsy and complained much of headache.

The first symptom of paralysis appeared in the bladder eight days before death; and five days later it was followed by a transient paresis of the facial muscles and the extremities of the right side. At no time was there any loss of sensation. A few days later the patient died in deep sopor.

The probable diagnosis of a cerebral affection—made in the beginning from the disturbance in the reading faculty—had now become more certain as the disease progressed, chiefly from the right hemiparesis. It also seemed probable that the left hemisphere was the seat of the lesion. A more exact statement concerning the localization and character of the disease—whether circumscribed inflammation, infarct, or apoplexy—could not yet be made. The age of the patient, the normal sphygmographic tracings of the peripheral vessels, and the lack of any appreciable sign of atheromatous changes in the superficial arteries of the head seemed to speak against the latter. Therefore the theory of a circumscribed inflammation seemed the most plausible. The autopsy soon settled the matter by revealing three apoplectic foci located in and around the corpus striatum of the left hemisphere.

According to their situation and varying stage of transformation they were evidently in causal connection with the three separate attacks and, in like manner, with the characteristic disturbance in reading.

The first, most anterior and external focus, which showed already marked signs of yellow softening, stands in decidedly causal relation, according to time of origin, with the sudden eclamptic attack which occurred eight weeks before death.

It is to be noted that the seizure took place when the upper portion of the body was raised from the recumbent position while the head was at the same time turned towards the left. By this position the jugular vein of the left side is naturally compressed and the return of blood from that side of the head prevented. Now if the vessel-walls had lost their normal elasticity a rupture would easily occur.

After the convulsions ceased no evil results were observed since no parts of the brain presiding over important functions were destroyed, except the anterior portion of the corpus striatum and that portion of the white substance lying in front of it.

The convulsions which occurred eight days later were evidently caused by the second focus, lying above and to the outer side of the first. Here the transformation of the blood-clot was less far advanced, and exhibited the characteristics of red and not yellow softening.

The effect of this focus was felt not so much in a direct destruction of any important part of the brain as by pressure upon adjacent parts. Its origin was accompanied with a more severe headache and the peculiar disturbance in reading. The posterior portion of the left inferior frontal (Broca's) convolution, generally conceded to be the centre of speech, was not at all involved, while the subcortical white substance of this region was extensively destroyed.

There was at no time during the course of the disease amnesic or ataxic aphasia, agraphia, or a loss of the ability to understand spoken language. There was merely a want of ability in the brain to conceive and produce in language the pictures of words and letters as painted by the eye.

So we must suppose the existence of a mental æsthenia —a diminution of strength,—which depended upon a disturbance of nutrition in the organic parts of the brain presiding over the function of reading.

From observations of other cerebral affections, in which there was a disturbance in the reading faculty, we have been led to suppose the existence of an organic connection, more or less close, with the centre of speech. So we will not err greatly if we make responsible for the above-mentioned symp-

tom that part of the brain occupied by the patch of yellow softening and affected by pressure of the second focus.

The transient paresis, occurring three days before death, was in all probability due to the recent effusion of blood into the nucleus lenticularis. This effect was only felt for a short time, for the paresis disappeared as soon as the parts around the lenticular nucleus became adapted to the pressure.

This group of symptoms agrees altogether with the well-known picture of affections of the nucleus lenticularis, where foci of a moderate size are accompanied by motor paralysis. As was before stated, this paresis lasted only one day, death occurring a few days later while the patient was in a soporous condition.

Since the literature of this subject, with the exception of Berlin's report, is wanting, I hope I will be pardoned for a somewhat detailed description. Moreover, I hope to show how important it is, as regards both diagnosis and prognosis, for the ophthalmologist to be familiar with this symptom.

And now I wish to add only a few words concerning the term "dyslexia" itself.

This mixtum compositum of Greek-Latin origin could much better, according to my opinion, be substituted by a word taken entirely from the Greek, since it is formed in imitation of the word "alexia," which is etymologically just as incorrect. It is composed of the Greek prefix, δυς, and the Latin legere; λεξις, in Greek meaning speech, language. For practical reasons, words composed from an ancient language are preferable, on account of the easier international understanding of their meaning. But I see no reason why we should allow the continuance of a mistake elsewhere made.

Why should we not substitute for it the word "dysanagnosia," which is taken entirely from the Greek, and is perfectly distinctive? To the uneducated this word will, of course, also present difficulties, but when it is once understood there will be no further trouble.

Indeed, by this addition we introduce an idea hitherto unknown to our pathological experience, and we have a term that at least need not be ashamed of its hybrid origin.

A CASE OF ZONULAR CATARACT IN AN ADULT WITH EXTRACTION AND MICROSCOPIC EXAMINATION.

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ON account of the rare opportunity to obtain suitable material, our knowledge of the minute anatomical conditions present in zonular cataract, is very limited. Deutschmann, *Arch. f. Ophthal.*,[1] was the first to report the results of a microscopical examination of a zonular cataract. The difficulty of obtaining a microscopical examination of a cataract so often met with, is due to the fact that if an operation is undertaken it is by discission, or the optical defect is in part overcome by an iridectomy, the use of a mydriatic, or by fitting glasses. Extraction of the complete lens seldom occurs, nor does it often happen that one can secure after death an eye which contains a zonular cataract. Von Gräfe[2] examined four lenses which he extracted by the flap operation in preference to making discission, from patients advanced in years. He utilized these specimens to confirm the observations first made by E. Jäger[3] and later by direct observation by himself. Von Gräfe determined

[1] Pathologisch-anatomische Untersuchung eines menschlichen Schichtstaares, *v. Gräfe's Archiv*, vol. xxxii., 2, p. 295.

[2] *Archiv f. Ophth.*, vol. i., 2, p. 236. Ueber den Schichtstaar.

[3] Staar und Staaroperationen, 1854, p. 17. "Staarform mit isolirter Faserschichttrüburg."

the fact—as shown in a transverse section of a dried lens—that the defect in zonular cataract consisted of an opaque whitish line ($\frac{1}{3}$ to $\frac{1}{2}$ *mm* thick) which separates a transparent cortex from a transparent nucleus. No microscopical examination is reported. To Zehender, Matthiessen, and Jacobson belong two cases which were utilized by them, as will be seen further on, to determine the coefficient of refraction of the differenr layers. Deutschmann improved an opportunity to examine a zonular cataract contained in a globe which was enucleated after death. The author's is the second case examined microscopically.

During the winter just past Prof. Schweigger extracted a zonular cataract and kindly placed the specimen at my disposal. I here wish to express my thanks to Prof. Schweigger for the privilege of examining the specimen, also to thank Prof. Becker, of Heidelberg, for his kindly assistance in making the microscopical examination.

The history of the case is as follows.

G. Kothe, 50 years old, presented himself to v. Gräfe in 1862. Zonular cataract, which occasioned great reduction in vision, was present in both eyes. The cataract in the right eye was operated on by repeated discissions. Absorption of the lens substance was well advanced when the patient had an attack of granular conjunctivitis; at about the same time ulcerative amygdalitis, furunculosis, a general skin eruption, and marked depression of the general health supervened. Severe iritis followed with the appearance of pus first in the anterior then in the posterior part of the globe. The result was phthisis bulbi followed by enucleation. On account of the above process in the right an iridectomy was made in the left eye instead of discission.

After the iridectomy the patient was able to see near objects very well, distant objects were less distinct; however, his vision was good enough to enable him to resume his work. Since early in 1886, the patient's vision has been failing, this being manifested by the blurring and distortion of images and by double vision. This annoyed him to such an extent that on December 17, '86, he was obliged to give up his situation and to stop work. At his request the lens was extracted.

Status: Coloboma of the iris downward and inward. Oblique

illumination shows the nucleus of the lens to be inclosed in a grayish evenly opaque layer which lies nearer the periphery than the centre of the lens. The posterior concave can be readily seen through the anterior convex layer, giving the impression of the presence of a clear nucleus. The cortical layers of lens substance are transparent. The equatorial border of the lens can easily be seen through the coloboma. By reflected light the centre of the lens appears darker than the surrounding red field, but is not completely opaque ; it permits the passage of a little light, and is grayish-red in appearance.

Vision : S $= \frac{1}{12} - \frac{1}{5}$; 0.4 at 6 *cm* with difficulty. With stenopaic slit S $= \frac{1}{5}$, not improved with glasses.

The teeth are of the rhachitic type. Patient first learned to walk at the age of four years. In the operation for extraction an incision was made with a small knife into the sclerotic opposite the coloboma. After a peripherical capsulotomy the lens was removed with difficulty, much of the soft cortical substance being stripped off. Pupil black. The wound healed favorably, but two discissions were necessary to clean the pupil of the remnants of lens matter and capsule. The patient obtained good vision (S $= \frac{6}{12}$).

The freshly extracted lens presented a very instructive appearance. The transparent cortex was very slightly hazy ; between it and the nucleus the opaque zone appeared as a very thin uniform layer of a now more yellowish color. In this opaque zone the structure of the lens was beautifully shown. On one side three narrow grayish stripes radiated from the centre toward the equator, and shorter rays branched off on either side like the rays of a feather. On the opposite side a large number of stripes ran from the periphery towards the centre, uniting in pairs before the centres were reached, forming many sectors, of which four were well marked. Inside of this zone lay the apparently clear, transparent nucleus. The lens was placed in 60 % alcohol, which was gradually changed to absolute alcohol. After remaining eight days in absolute alcohol, the lens was embedded in celloidin, and transverse sections were made by use of the microtome. Some of the specimens were examined in glycerine without staining, others were examined after staining with Lugol's solution, alum carmine, and hæmatoxyline.

In the sections the cataractous zone appeared as an oval band (Fig. 1). The long diameter of the oval in a central section was

6 *mm*, transverse diameter 2.1 *mm*, while the same measurements for the extracted lens, without the capsule and extreme outer cortical layers, were 7.3 and 3 *mm*. The cataractous zone itself varies in width from 0.016 to 0.08 *mm*, being narrower than that described by v. Gräfe[1] ($\frac{1}{3}-\frac{1}{2}$ *mm*) and Rydel[2] ($\frac{1}{3}'''-\frac{1}{4}''' = 0.36-0.54$ *mm*).

On one side of the oval, probably corresponding with the posterior portion of the lens, the convexity of the cataractous zone is greater than on the other (Fig. 1, below). Under the microscope the cataractous band loses its continuous appearance: if we trace the band from the anterior around to the posterior portion of the lens (Fig. 1 *c*), it appears to be broken at the equator, the anterior part overlapping the posterior, as though the posterior portion of the cataractous zone occupied a layer of lens substance nearer to the centre of the latter (Fig. 1 *d*). Outside of the posterior, corresponding to a continuation of the anterior zone, single short lines are to be seen, which, if united, would form a continuous band with the outer zone. In the same manner the inner zone (posterior portion) is represented by single lines on the posterior side of the anterior band. The zonular cataract in this case is therefore double, being composed of two incomplete zones, the outer zone represented by the anterior band, the inner zone by the posterior band. These zones run together in places; in places are separated by unchanged lens tissue. The union of the two zones through short transverse bands is most noticeable in the anterior portion of the lens. Outside of both of the principal zones single small lines may be seen which may be considered as indicating a third zone. Small, opaque, parallel stripes also appear in the cortical layers, being larger and most plentiful at the equator. This resembles the early appearance of senile cataract (Fig. 1 *e*). At the poles this condition is also pronounced (*f*); nothing of this kind, however, is seen in the nucleus.

More highly magnified, the inner as well as the outer zone appears to consist of one or more fissures, which run parallel to the surface of the lens. These spaces are filled with granular masses, which, on account of their possessing an index of refraction lower than that of the normal lens tissue, produce the opacity. Greatly magnified, the contents of the fissures appear to be composed of

[1] *Arch. f. Ophth.*, Bd. i., 2, 5, 236.

[2] Stationaler Kernstaar oder Schichtstaar, *Wiener Medicinische Halle*, 1864, p. 70, etc.

large granules of quite uniform size. In this granular mass round, highly refractive bodies are scattered, which remain unchanged when treated with Lugol's solution or with sulphuric acid ; they possess a single contour, and are consequently to be considered as fat globules (Fig. 2 and 3). There is no appearance of cholesterine crystals or calcareous formation. Single lens fibres branching from the walls pass into and through the masses in many places, becoming again attached to the same side, or passing to the opposite side, dividing the principal fissures into many small parts. However, in general, each cataractous zone consists of one continuous fissure. The walls of the fissure throughout the greater part of its course (except on the side of the nucleus, the change in which will be mentioned hereafter) are composed of normal lens tissue ; the surface is smooth with but little appearance of degeneration. In some places the lens tissue in the outer wall shows granular infiltration. Teased preparations show that the lens fibres themselves, without being separated, have become thickened, and that their bodies are affected by granular degeneration (Fig. 3, *u*). This condition, however, is not very pronounced, the cataractous zone being mostly composed of the before-mentioned fissure formation.

The fact that the cataractous zones are formed by a separation of lamellæ of lens tissue, leaving a fissure between, is clearly shown by the examination of a transverse section (Fig. 2, *c*) where two layers of lens substance separate and become again united. The accidental fissures near the periphery are also formed in the same manner ; their contents being the same as are found in the principal fissures. External to the opaque fissures at the equator are other fissures, not filled with the granular mass. It is difficult to say whether these are artificial or existed before death and were filled with a clear liquid.

There are also numerous short fissures in the cortical layers, which differ from the above mentioned, also concentrically arranged. Near the surface these are plentiful and measure about 0.08 *mm* in length ; farther from the surface they are smaller and less numerous, measuring 0.04 *mm ;* farther back they are very small and few in number (0.008–0.012), as shown in Fig. 4, *o*. The last mentioned are so small that their contents cannot be determined ; the others are filled with a granular mass much finer than that found in the cataractous zone, and from which it may be easily differentiated. It is not certain that these fissures existed

during life. The fact that they are found most numerous near the surface would indicate that their presence was due to some external influence, and it is very probable that the cause acted *post mortem.* They are to be distinguished from the spaces which Becker describes [1] as being present in the normal as well as in the cataractous lens, by their smallness, those mentioned by Becker measuring 0.35–0.6 *mm ;* also from the fissures, represented in the same work in the lower half of Fig. 24, Pl. v., which form between the layers of the lens in diabetic cataract by the absorption of water. The characteristic arrangement of the connecting fibres between the lamellæ is wanting, and the contents are not composed of drops, but of a uniformly coagulated granular mass.

The substance of the nucleus presents a peculiar appearance. It contains numerous distinct coagulated masses which appear to be post-mortem changes due to the action of the alcohol. This condition is not without interest, however, since it affects the entire nucleus, extending to the inner cataractous zone. Even with low magnifying powers (Fig. 1, *m*), the nucleus appears studded with small figures. Highly magnified, the figures appear long, spindle-shaped, or round, with sharply defined borders, their contents being slightly darker than the surrounding tissue in color, appearing something like nuclei. The substance of these masses appears to be homogeneous, but with the highest magnifying powers it is seen to be finely granular. They are from 0.008 to 0.002 *mm* in transverse diameter, and 0.013 to 0.075 *mm* in length, are not stained when treated with alum carmine, or hæmatoxylin, but are colored like the surrounding tissue when treated with Lugol's solution.

These masses appear to lie between the lens fibres, their longest diameter being parallel to them. In the sections through the centre of the lens the masses appear to be arranged concentrically ; many, however, do not follow this rule. Near the centre of the nucleus they are larger and longer, and are separated from one another ; in the neighborhood of the cataractous zone, smaller, more numerous, and irregular in shape, mostly round. In this peripherical portion of the nucleus the contour of the lens fibre layers cannot be made out, so that the relation of the masses to the lens fibres could not be determined.

A section in the principal axis of the lens, midway between the

[1] "Zur Anatomie der gesunden und kranken Linse," Wiesbaden, 1883, S. 33.

centre of the lens and the cataractous zone, is represented in Fig. 5 greatly magnified. We can here trace the same lamellæ for some distance. The masses above described are met with throughout their entire length. They possess irregular outlines, as though they had become lobulated during the process of coagulation ; they terminate in thin processes or are rounded off at one or both ends. The relation they hold to the tissue in the periphery of the nucleus is shown in Figs. 2, 3, and 4 ; as before mentioned, it is indefinite.

When these masses are isolated by teasing they are found to possess a contour of their own, and when broken across appear to be made up of a fine granular mass.

Although it is not possible to prove that the masses under consideration did not exist *ante mortem*, we may reasonably consider them the result of the hardening process, as, so far as I am aware, this condition does not appear in cataractous lenses which have been hardened in Müller's fluid while in an immature senile cataract hardened in alcohol I have observed the same condition. It is probable that had they existed in such large numbers during life, they would have produced an opacity of the nucleus which could have been determined through the cataractous zone. From what we have seen, the supposition becomes very strong that there must have been a chemical change in the substance of the nucleus before death, since the cortex remains free from these masses. If we admit a chemical change in the nucleus during life, it is plausible to refer this change to a period before the cortex was formed. It is not otherwise possible to explain how the cortex remains normal while the nucleus, equally normal at first, is affected by the degenerative change. It cannot be held that the previously formed cataractous zones, by interference with the nutritive current, could produce these isolated changes in the nucleus, since not the outer but the inner cataractous zone marks the dividing line between normal and changed lens substance ; the tissue between the rings is devoid of these changes. This change cannot therefore be due to mechanical interference with the nutrition to the part.

The morphological and chemical structure of the nucleus,

studied carefully in a lens obtained directly after death, would certainly be of great interest. It is apparent that any change noted in so delicate a structure as the lens should be substantiated by examination in the fresh state. The fresh nucleus was not examined in this case, as no change was supposed to exist in it, and, in order to preserve the topographical relations, it was necessary to harden it at once.

In endeavoring to determine the manner of the production of zonular cataract from the conditions found, we may also have recourse to the existing theories in regard to the matter. According to Arlt and Rydel[1] an opacity of an outer layer is produced by the friction of a hard nucleus against a soft cortex during violent motion of the child while in a spasm. According to Horner and Davidsen,[2] a pathological layer of lens substance is deposited about a normal nucleus, analogous to the developmental anomalies in the teeth, due to a disturbance in nutrition in rhachitis. Leber[3] would modify the opinion by holding that the normally formed layer became changed subsequently.

According to these views it must be assumed that in this case both cataractous zones, possibly also the zone between them, were effected by the degenerative process, either during or shortly after their formation. This is at variance with our opinion, since the condition present does not appear to consist of an opaque layer of lens tissue, but of fissures between lamellæ of lens fibres. This view is in part substantiated by the observations of Förster,[4] who describes the beginning of senile cataract in the cortex of the nucleus as consisting of fissures between concentric lens-fibre layers, the fissures being filled with a granular substance. They have been already described in like manner by Becker in *Gräfe-Saemisch*,[5] and later in his work "Zur Anatomie der

[1] Rydel: Ueber Schichtstaar, *Wiener Med. Halle*, 1864, p. 70, u. f.

[2] Jophus Davidsen: Zur Lehre vom Schichtstaar; Inaug-Dissert, Zurich, 1865.

[3] Kernstaarartige Trübung der Linse nach Verletzung ihrer Kapsel nebst Bemerkungen über die Entstehungsweise des stationären Kern-und Schichtstaars überhaupt.—*v. Gräfe's Arch.*, vol. xxvi., 1, S. 283.

[4] Zur pathologischen Anatomie der Cataract, *v. Gräfe's Arch.*, Bd. iii., 2, S. 191.

[5] Pathologie und Therapie des Linsensystems, Bd. v., S. 256; Wiesbaden 1883, S. 68.

gesunden und kranken Linse." The cause given by these authors is uneven contraction of the peripherical fibres and layers which separate them forming fissures. An abnormal amount of the fluid portion of the lens collects in these fissures. The index of refraction, at first alike in all of the elements concerned, now becomes changed in the stagnant contents of the fissures, producing opacities. An abnormal process of diffusion is set up, by which the lens fibres lose a portion of their substance and absorb a portion of the contents of the fissures. A disturbance in the nutrition of the parts is thus brought about, which leads to a change in the chemical composition of the lens fibres and in the liquid portion of the lens tissue.

Becker finds confirmation of these views in the report by Priestley Smith[1] of the examination of a lens showing a decrease in volume which presented the first stage of senile cataract, and was considered by him to be normal for that age.

In our case of zonular cataract, we find also fissure formation at the periphery of the nucleus; it is extensive, almost completely surrounding the nucleus. If from analogy we conclude that this condition is not the result of active separation, brought about by the expansion of a substance developed between the fibre layers, but was produced by a contraction of lens tissue, the change must have effected the whole nucleus.

The observation that the lens with zonular cataract is as a rule less in diameter than the normal lens, would argue in favor of the shrinking process; it may also be claimed that the disturbance of nutrition, which may have caused the change in the intermediate zone, would prevent development of the lens to the normal size. In mentioning the fact that the diameter of the lens in zonular cataract is less than in the normal lens, v. Gräfe[2] expressed the opinion that the decrease in diameter was due to *contraction of the nucleus included in the cataractous zone.* To this author must be credited the first observation of this condition. He observed typical zonular cataract in a child of three

[1] *Medical Times and Gazette*, Jan 20, 1888.
[2] *v. Gräfe's Archiv*, vol. iii., 2, S. 379.

years. The nucleus was transparent, and there was no appreciable diminution in the size of the lens. After three months v. Gräfe found that, instead of the very slight opacity, the pupil was occupied by a yellowish-white (calcareous) capsule, which enclosed the nucleus. The lens was now smaller than before, the cortex perfectly transparent; no other change was observed. v. Gräfe further says that the shrinking is not dependent on the presence of calcareous deposits, but occurs when no chalk is present—as was the fact in our own case.

If shrinking of the nucleus, as in v. Gräfe's case, can be determined as early as the third year of life, it is not assuming too much to conclude that the beginning of the shrinking process may be much earlier before the opaque zone has appeared. If then the presence of the opacity depends on the shrinking of the nucleus, cannot its first appearance depend on the same thing?—the lens, as a rule, become smaller than the normal before the opacity appears.

If, therefore, on account of the presence of the concentric fissure, the analogy with Becker's theory regarding the formation of senile cataract and, further, the observation of v. Gräfe regarding the shrinking of the nucleus, we admit the cause of zonular cataract, to be a contraction of the nucleus of the lens, this alteration in volume must have been occasioned by a chemical change in the tissue involved, brought about by some unknown degenerative agency connected with rhachitis, probably an interference with nutrition. Layers of lens substance formed subsequent to this period would remain unaffected. In fact, we find a marked difference between the nucleus and cortical layers. In the first, scattered throughout its whole substance, we find the coagulation masses mentioned above, from which we must conclude that the nucleus, at a period before the formation of the cortex, underwent a chemical change.

Further, it is stated by Zehender, Matthiessen, and Jacobson [1] that the nucleus of zonular cataract possesses an ab-

[1] Zehender and Matthiessen: Ueber die Brechungscoëfficienten cataractöser Linsensubstanz, *Zehender's klin. Monatsbl.*, vol. xv., p. 239. Zehender, Matthiessen, and Jacobson: Ueber die Brechungscoëfficienten und die chemische Beschaffenheit cataractöser Linsensubstanz. *Ibid.*, p. 311 und vol. xvii., p. 307.

normally high index of refraction, which does not agree with that of the nucleus of other individuals of the same age. In two cases examined, the following was found:

	Boy of 5 years.	Boy of 11 years.	Normal transparent lens of young person.
Cortex	1.4099	1.4194	1.3867
Outer		1.4234	1.4043
Middle nuclear layers	1.4180	1.4344[1]	to
Inner	1.4187	1.4253	1.4154

The above authors claim that with a change in the coëfficient of refraction of the cataractous lens there is a change in the quality of the badly nourished lens substance,—the case in the nucleus of zonular cataract. The fact may also here be mentioned that v. Gräfe[2] has observed that the nucleus in these cases is harder than in the normal lens.

The contraction due to the chemical alteration in the nucleus would naturally be the first step in the development of the circular fissure if surrounded by a capsule that is no longer elastic, as, for instance, a subsequent formation of cortical lens tissue which has not been subject to the injurious influence which affected the nucleus. The formation of the new transparent lens tissue was directly observed by Leber[3] in a young rabbit, in which traumatic cataract was induced. By subsequent development a perfectly clear layer of lens fibres formed enclosing the opaque mass. Similar to this is an earlier case reported by Becker[4] of nuclear or zonular cataract which was caused by a perforating ulcer of the cornea.

The formation of the second, outer cataractous zone can be attributed to nothing but the continuation of the same injurious cause, since the lens tissue between the two layers, does not show the change present in the nucleus. It may be well to state that it is not absolutely certain that the

[1] The opaque zone.
[2] *Arch. f. Ophth.*, vol. i., 1, p. 256.
[3] *Cf.* above.
[4] Cataracta capsularis centralis ant., with cataracta nuclearis. Bericht über die Augenklinik der Wiener Universität, 1863–1865. Wien, 1867.

layers of lens substance formed later are inelastic. It is probable that the first cortical layer, after the formation of the first fissure, contracted a little in this way, leading to the formation of the second fissure. The separation and degeneration of the neighboring lens fibres is to be regarded as a secondary process. Von Gräfe's case goes to substantiate the conclusion that the process of contraction continues for some time,—for years in some cases; also the fact that zonular cataract is often overlooked in early life, and, in later years, on account of an increase in the opacities, probably due to widening of the fissure, is recognized. Perhaps the increase in the opacity of the lens in the adult reported by Leber [1] may be referred to the same cause.

We must await more extensive observation before we can determine the general significance of the anatomical conditions found in our case. If we compare this with the case reported by Deutschmann, it is to be noticed that in his case the nucleus appeared clear and unchanged. This confirms our opinion that the coagulation products in our case were of post-mortem origin, but does not disturb the opinion that the nuclear substance had undergone a chemical change shortly before the formation of the cataractous zone without having first produced a noticeable optical defect.

Then also in the production of senile cataract there is a diminution in volume—a contraction depending on a previous chemical change, noticeable in the earliest stage (Priestley Smith). The fissure formation is brought about by the contraction of this tissue, which shows changes when examined either by reflected light or by the microscope, but which might easily pass for "normal."

It is further noticed that as a rule the nucleus appears to be clear when viewed through the cataractous zone, but at times opacities can be determined even under these conditions. v. Gräfe [2] speaks of a "no longer entirely transparent" nucleus, and further says that soon after the deposition of calcareous material in the cataractous zone the nucleus becomes opaque, shrinks, and also becomes calcareous.

[1] *Cf.* above, S. 292.
[2] *v. Gräfe's Archiv*, vol. iii., 2. p. 380.

Deutschmann describes the cataractous zone as follows: In unteased preparations the lens fibres appear intact, their contents being changed by the presence of numerous vacuoles and very small myeline drops. In some places fissures and openings between the fibres are found which are filled with granular highly refractive detritus, resembling oil globules and small myeline drops. Teased preparations of this part show that this conjecture is correct. The larger portion of the lens fibres are preserved as such, but their edges are notched and very irregular; their contents hyaline in character, containing numerous vacuoles and coagulated myeline granules. In isolated places small fibres are seen, which are varicose, unusually granular, and broken. Between the fibres, highly refractive granular masses, intermingled with large coagulated myeline drops, are seen.

A second outer, not completely opaque, layer consists of very fine granular detritus and myeline drops; the lens fibres in the immediate vicinity are separated by numerous small fissures, and are embedded in detritus. It was possible to isolate lens fibres from those opaque masses; they appeared as small, highly refractive bands, showing numerous vacuoles, coagulated myeline drops, etc.

It appears, from the above, that here also fissures existed in the lens substance, in which detritus accumulated; these appear to have formed the most part of the outer zone, but not to have reached such a degree of development in the inner zone as appeared in our case. The degeneration of lens fibres was more marked. In general, however, the two cases resemble each other, and there is nothing in Deutschmann's case to militate against the idea that the formation of fissures was the primary, and the degeneration of lens fibres a secondary condition.

In conclusion we may summarize as follows: Scattered throughout the nucleus of the cataract examined, we find numerous small masses, which are apparently post-mortem coagulation products. This nucleus is surrounded by two oval zones of cataractous substance, neither complete nor continuous, which are separated by a layer of normal lens tissue. These zones are, however, united here and there.

Both zones consist in greater part of large and small fissures, which are filled with detritus. In their immediate vicinity lens fibres are formed, which are in process of cataractous degeneration. The cortex is composed of normal lens tissue, but presents a number of small fissures, apparently accidental, which are filled with detritus, and at the periphery a number of small fissures may be seen, which were apparently produced artificially.

Considering the conditions found, we conclude—analogous to the conclusions of Becker regarding the formation of senile cataract—that a chemical alteration in the subsequent nucleus, brought about by a change in the nutrition of the part, attending rhachitis, is the primary factor. This change takes place when the subsequent nucleus forms the entire lens and is followed by a general contraction of the affected part, which causes the formation of fissures between this part and the normally developed, unaffected, cortical layers of lens substance that are formed later. A granular deposit takes place in the tissue plasma collected in the fissures, and at the same time the neighboring lens fibres take on a form of granular degeneration. The partly formed fissures found in the cortex are probably due to contraction of the tissue occurring in later years.

These conclusions may be further substantiated by the analogy between zonular and senile cataract established by Förster[1] in his investigations on the pathology of senile cataract, the difference of course being that in zonular cataract the injurious influence affects the substance of a partly developed lens only, the portion formed later remaining unimpaired. In opposition to our view, that the whole mass of the lens developed up to a certain period undergoes a chemical change, is the theory that zonular cataract is formed by the deposition of a layer of pathological tissue about a normal nucleus, or that a normally formed cortical layer undergoes a pathological change subsequently.

Explanation of the Plates. (*Plate I. and II.*)

FIG. 1.—Drawing of entire section of lens, made with camera lucida and low magnifying power. Above, the anterior; below, the

[1] *v. Gräfe's Archiv*, vol. iii., 2, p. 197.

more convex posterior, portion. *a*, Nucleus ; *b*, cortex ; *c*, outer zone of the double zonular cataract, at the equator and anteriorly ; *d*, inner zone ; *e*, accessory fissures with granular contents at the equator ; *f*, fissures of like nature near the poles ; *g*, artificial fissure in the middle of the opaque zone on the front side ; *h*, empty fissure in the cortex, probably artificial ; *i*, transverse fissure passing inward from the principal fissure ; *k*, transverse fissure passing outward into the cortex ; *l*, dividing lines between the lamellæ ; *m*, coagulation products in the nucleus. The same drawing holds for the following figures. *q*, Artificial parallel lines in the tissue, produced by the cutting process.

FIG. 2.—End of the outer cataractous zone at the equator, corresponding to a place above and to the left in Fig. 1. Zeiss Oc. 3, Homog. immers. $\frac{1}{12}$, 695 diam. Both cataractous zones appear here as single fissures filled with finely granular masses and drops of fat.

FIG. 3.—Degeneration of the lens tissue, a little to the outer side of the single fissure at the inner cataractous zone. Lens fibres studded with molecular masses (*n*). Zeiss Oc. 3, Obj. D. D., 320 diam.

FIG. 4.—Principal fissure of the zonular cataract with lateral transverse fissures, corresponding to the place indicated by "*i*" in Fig. 1. Artificial lumen in the middle. Outer zone (*c*) complete, inner (*d*) incomplete ; *o*, very small apparently post-mortem fissures in the cortex. Zeiss Oc. 2, Obj. C., 145 diam.

FIG. 5.—Coagulated secretion between the lens-fibre layers of the nucleus. Zeiss Oc. 4, Homog. immers. $\frac{1}{12}$, 950 diam.

CONTRIBUTION TO THE HISTORY OF CASES OF AFFECTIONS OF THE EYE RESULTING FROM LIGHTNING STROKE.

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Translated by Dr. J. H. Shorter.

THE number of cases of eye trouble, resulting from stroke of lightning, which have been thus far observed, is quite limited.

Leber[1] collected eighteen cases, and one each was reported by Purtscher,[2] Pagenstecker,[3] Laker,[4] Vossius[5] Meyhöfer,[6] and Uhl.[7] The last of which was associated with anæmia of the optic nerve, and deserves mention on account of the satisfactory therapeutic effect obtained by inhalation of nitrite of amyl. Cataract was found in nine cases, from which we exclude the one of Vossius, in which the cataract may be regarded as not resulting directly from the lightning stroke, but as connected with the choroiditis. The remaining thirteen cases displayed the most varied pathological conditions, as optic neuritis, hemorrhages at the macula lutea, partial atrophy and anæmia of the optic nerve, rupture of the choroid, choroiditis, and remotio retinæ, accompanied frequently by ptosis, ophthalmoplegia, opacities of cornea, and intolerance of light.

[1] *Gräfe's Arch.*, vol. xxviii., Sec. 4.
[2] *Gräfe's Arch.*, vol. xxix., Sec. 4.
[3] Schweigger and Knapp's Arch., vol. xiii.
[4] Ibid., vol. xiv.
[5] *Berliner klin. Wochenschrift*, 1886, Nos. 19, 20.
[6] *Klin. Monatsblätt. f. Augenheilk.*, 1886, Sept.
[7] *Ibid.*

Concerning the nature of the cataracts: In five cases they were encountered in both eyes (Brisseau, Downar, Leber, Pagenstecker, Laker), and formations on one side only (Foye, Rivaud-Landreau, Servais, Meyhöfer); they were either stationary and partial, such as anterior polar, punctated and striped opacities of the anterior cortex, superficial opacities of the posterior cortex, opacities of the anterior and posterior capsules, or had a progressive character. Common to all, however was the fact that in no case did any spontaneous clearing up of the opaque parts of the lens set in.

Standing in contrast to this is a case which was brought to this clinic in the summer of 1886, treated for a time, and most carefully followed ophthalmoscopically. The clinical history is as follows:

Wilhelmina Schneider, three and a half years old, came to the Policlinic on May 26, 1886. The father stated that on the day previous there was a terrific storm at his home, during which his house was struck by a thunder-bolt, set fire to, and destroyed, the mother of the child killed, and the latter itself struck.

The more particular statement was to the effect that the mother and child were in the kitchen when the lightning descended the broad chimney which gave free communication with it; both were crushed to the ground, and dragged lifeless out of the burning house, but without any trace of a burn present on their persons. Attempts at resuscitation were fruitless in the case of the mother, but the child, on the contrary, after being treated for five hours with vinegar compresses to the head, came to again, but was very cross and fretful; kept the face depressed and the eyes spasmodically closed. Owing to this the father came on the next day to Berlin.

States May 26, 1886: Strong, stout, very uneasy child, with pretty blond hair; face and body free of any wound or burn; the hair not singed; no paralysis, so far as could be determined by the fact of child being able to run about the room, raise the arms quickly, etc. The eyes kept fast shut, even in a dark room; the lids slightly œdematous, without redness; cilia intact; palpebral conjunctiva somewhat hyperæmic, perhaps, however, also normal, and only hyperæmic in consequence of the forcible opening of the lids; marked pericorneal injection; around the

cornea, a breadth of half a centimetre backwards, a partially transparent swelling of the bulbar conjunctiva, one millimetre in height, partially transparent, and of a glass-bead appearance. Towards the equator of the globe were visible on the normal conjunctiva and sclera only isolated injected superficial conjunctival blood-vessels.

The surface of the cornea intact, but in the substance of the cornea proper were uncommonly numerous faint gray-striped and punctated opacities, located especially in the external corneal layers, very delicate, but at the same time interfering to a high degree with the transparency. The deeper layer seemed to be unimpaired.

The anterior chamber of ordinary depth ; the aqueous humor apparently clear ; the pupils black, of equal size, reacting to light rather sluggishly ; the irides grayish-green. Whether the coloration was normal, or there had been a change of color, could not be determined with certainty, as both eyes presented the same picture. A hyperæmia of the iris may, however, be assumed, as the picture of its surface is not very sharp. The ophthalmoscopic examination was made under ether, and with the pupils dilated to the maximum by atropine. The lens showed no changes either by focal or transmitted light, although the image was not very sharp, owing to the corneal opacities ; absence of any vitreous opacities ; pupilla and macula lutea normal ; tension unaltered. The foregoing report applies to both eyes equally.

The examination took place at noon ; three hours later the child was playing about the station, running around, eating apples, etc., and in moderate light opened the eyes half-way. The whining voice has already in great measure disappeared, there are no signs of any psychic disturbance, and the vegetative functions leave nothing to be desired. The watch is recognized as such.

Ordered : Atropine, and compresses of lead water.

May 27th.—Very clear voice. Eyes opened even in the light. Lids still barely swollen. Ocular conjunctiva as it was yesterday. Only a hint of corneal opacity still remaining.

Examination made again under anæsthesia and with maximum dilatation of the pupils. Both by focal and transmitted light from a plane mirror there are seen in both lenses to the inner and lower part numerous (about fifteen) symmetrically situated, very delicate radial opacities, lying immediately under the capsule, and running forward almost to the anterior pole, which are

so very fine as to be overlooked with the concave glass. The rest of the lens is clear. The lens capsule intact. On awakening from the anæsthetic, some photophobia and lachrymation.

May 29th.—The injection and swelling of the bulbar conjunctiva is much less. The eyes open well in the light. A few individual opacities still present in the cornea. The extremely delicate lenticular opacities are greater in the left eye than in the right.

June 1st.—Both eyes free of irritation. There being no annoyance, no further treatment was ordered.

June 3d.—Swelling of lids has subsided ; palpebral conjunctiva normal ; ocular conjunctiva no longer swollen ; here and there the superficial blood-vessels still injected. Cornea and aqueous entirely clear. Iris of a grayer tint, no longer changed in color ; pupils dilated, no synechiæ. In the lenses the delicate opacities have disappeared, but in place of them there has appeared in the last two days in both eyes symmetrically, downwards and outwards, about 2 to 3 *mm* distant from the corneal margin, an intensely grayish-white opacity about 1 *mm* broad to 2 or 3 *mm* long, lying directly under the anterior capsule, and of crescent shape, with the convexity turned towards the corneal margin, from which single, rudimentary, irregularly shaped little branches go off. That in the right is a little larger than in the left. Fundus is normal. The vision is good : a pin thrown on the floor is immediately picked up.

Patient was discharged, with instructions to report in three months.

Probably through lack of money and because the child kept well the father did not come, on which account I requested the family physician, W. Stieber, in April, 1887, that is eleven months after the occurrence of the mishap, to examine the child.

Without my specifying to him any more exactly the probable condition, he described the above-mentioned collections in both eyes, but found that the lenses were otherwise transparent, and that the child could see well. Thus there had been no change, and it may be expected that this condition will remain.

To summarize in brief : The lightning struck down the child, leaving it senseless, but without hitting it directly or producing any burn whatever. Five hours later it regained consciousness, with mind and body uninjured, with the exception of the eyes. The latter showed considerable intolerance of light, swelling and

injection of the ocular conjunctiva, opacities of the corneæ, which disappeared in course of a few days, and lens opacities in both eyes, which were not diagnosed on the first day, though probably already present at that time, but not visible by reason of the opacities in the cornea. The very delicate opacities in the lens were recognized on the second day, disappeared after six days' duration, and left in their stead a denser one, which can still be seen. The eyes are otherwise perfectly sound.

The above-cited symptoms are among those which have been most frequently mentioned and carefully described in different earlier publications, so we can quickly pass over them at this time. It only remains to restrict ourselves to the consideration of the lens opacities, the disappearance of which in cases of cataract from lightning stroke have never yet been observed. Of other cases of cataract, in which a clearing up of the opaque lens substance took place, I can only recall, of late years, that of Landesberg,[1] in which case (one of traumatic cataract) a restoration of transparency of the lens took place in some weeks, with vision = $\frac{5}{18}$. The cases of Brettauer,[2] Newmann,[3] Lange,[4] stand on another grade, representing, as they do, not those of clearing up, but of resorption of cataractous lens masses in elderly persons, for which it required always a period of time of many years' duration; in Lange's case, thirteen years.

But it is not with such as these that we have to deal in the case of this child; here the opacities of the lens were genetic, and in their further course showed absolutely nothing in common with the former.

We assume with Leber that opacities arise in the lens in the manner of a catalysis, but in our patient we will make prominent the fact that we are not considering a case of opacity of the lens fibres, but of an opacity caused by coagulated albuminous masses external to them. Whether (as according to Deutschmann, Schwalbe[5]) there is found lying directly under the anterior lens capsule and between

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[1] *Klin. Monatsbl. f. Augenheilk.*, Aug., 1886.
[2] Report of the Ophthalm. Congress of Heidelberg, 1885.
[3] ARCH. OF OPHTHALM., Schweigger and Knapp, vol. xiv.
[4] *Gräfe's Archiv*, vol. xxxii., Part 4.
[5] Schwalbe: "Lehrbuch der Anatomie der Sinnesorgaus," Erlangen, 1885.

the epithelium and the lens fibres a subcapsular and subepithelial albuminous layer, or whether the space in which the latter is contained represents a cadaveric appearance (Becker)[1] and only demonstrates here the tissue fluids which are present in all tissues, cannot be discussed in this place. But this much is certain, that there is an albuminous liquid there, which naturally is liable to coagulate from various causes. We may conceive of the catalytic action of the electric flash as being one such cause, and must consider, perhaps, that not only is a coagulation produced by it, but that in addition a distention of the capillary space between the epithelium and the mass of lens fibres by delicate honeycomb formations, perhaps on account of liberation of water, whilst the coagulation product radiating correspondingly with the fibres of the lens, can accummulate at the anterior pole.

Now this coagulum might become reabsorbed, or if remaining may undergo a change of position, both of which could have occurred in our case.

Regarding, as do Michel and Wagner,[2] the lentoglobulin and lentoalbumen as albumen bodies of the lens, of which we know that they coagulate, and in weak alkaline solution again dissolve, so it is nothing contrary to this to make the assertion that the coagulated albuminous bodies again passed over into a liquid condition under the influence of the alkalinity of the constantly circulating tissue fluids.

The disappearance of the opacities previously visible with the ophthalmoscope may be thus explained. The whitish-gray opacity which appeared on the sixth day and has until now remained stationary, might be described as a true capsular cataract (Becker), proceeding from some quite unknown alteration in the epithelial cells, although, self-evidently, it is not clear for what reason it should have appeared in each eye symmetrically. It may be probably connected with an affection of the nerve fibres.

On the other hand the view may be taken, that the albu-

[1] Becker: "Zur Anatomie der gesunden und kranken Linse," S. 37. Wiesbaden, 1885.

[2] Michel und Wagner: Physiol. Chem. Untersuchung des Agues, *v. Gräfe's Archiv*, Bd. xxxii., Abth. 2.

minoid bodies are not reabsorbed, but are displaced by the current and heaped up by it in one place, where they act as irritating foreign bodies and thus cause the formation of the new appearance. As to this one might object, looking from the symmetrical position of the present opacity, that the fine opacities were getting scantier, before any thing of the capsular cataract was visible; that the nutritive current flows towards the anterior pole, and that from the relative position of the first and later opacities a confused whirl in the current must be assumed, whereby, however, it then still remains unexplained how the flakes in the end become all collected.

It seems to me not an acceptable opinion that an opacity of the lens fibres has been present, about in the sense of Knies, who regards cataractous degenerations as processes of the same character as the opaque swelling of Virchow, an idea which cannot be lightly set aside without further discussion for the reason that, up to the present, nothing certain is known regarding a resorption of lens albuminous, opaque fibres causing a disappearance of the opacity of the lens, but especially for the reason that we have seen from several observations, Lange, etc.,[1] that a resorption of cortical substance can take place only after a stage of complete liquefaction, sometimes with a subsequent spontaneous clearing up of the later masses, in favor of which Knapp[1] also has declared himself; but nothing of the kind was visible in the lens, and at all events the time of six days was absolutely insufficient for a metamorphosis of such a nature.

Unfortunately I was not able to get a view of the chemical changes brought about by catalysis. Some may say that it is like the curdling of milk in a storm. But here also there are difficulties lying in our way: for some claim that the ozone, or, as otherwise expressed, the active acid material changes direct the milk sugar of the milk into lactic acid and alcohol, and that the lactic acid causes precipitation of the caseine and albumen, while others state that through influence of the ozone the ferment suspended

[1] Transactions of the Ophthalmological Society at Heidelberg, 1885, p. 57.

in the milk is favored in its vegetative development, and through the rapid growth of the same and the increased efficacy resulting therefrom, the above-mentioned chemical process is set up in the quickest time; others again combine both views and accept both the direct and indirect action of the ozone. But what the chemistry here in the lens is, where the ozone has to exert its action on two albuminous bodies suspended in an alkaline liquid, is a question in all cataracts from lightning stroke, but regarding which I have not been able to learn any thing from books or from experienced chemists.

One must satisfy himself in this regard, as said above, simply by regarding the opacities as being produced in the manner of a catalysis.

CONTRIBUTION TO THE MAGNET OPERATION.

(From the Clinic of the late Prof. Horner of Zürich.)

By Dr. E. NEESE, of Kiew.

Translated by H. A. B. MacCauley, M.D., of New York.

ALTHOUGH the material so carefully collected by Hirschberg[1] covers the ground pretty thoroughly, it would seem to me that further discussion of the magnet operation is necessary, in order more exactly to formulate the indications for the procedure, as well as to shed more light upon the circumstances which render its execution difficult or even frustrate it entirely.

Through the kindness of the late lamented Prof. Horner, while spending a summer in Zürich, I was enabled to utilize a series of observations, embracing forty-two cases, beginning in 1880 and ending in 1885, at which time the academical career of the celebrated clinical teacher was brought to a close.

The presence of a fragment of iron in the eye, following a traumatism, having been verified, it is next of most importance practically to determine whether the foreign body is situated in front of or behind the posterior capsule of the lens. If in front of the posterior capsule, providing its proportions be such as to admit of the use of the magnet at all, the operation is quite easy. When, however, the foreign body is imbedded in the posterior region of the globe, the conditions are more difficult, and the result more doubtful. As regards the anterior chamber, the cases pre-

[1] "Der Electro-Magnet in der Augenheilkunde." Leipzig, 1885.

sented are simply additional examples of the advantageous operation of the magnet, as compared with simple mechanical extraction. When the posterior section of the eyeball is implicated, the magnet is then our only resource, but the results obtained, are by no means as satisfactory.

I.—ANTERIOR SECTION OF THE GLOBE.

a.—Cornea.

The magnet, of course, is not brought in question in those cases where the splinter of iron has simply pierced the more superficial layers of the cornea. We must, however, fully agree with Hirschberg in thinking it indicated in cases where the foreign body lies so deeply imbedded in the cornea or sclerotic as not to be easily reached with mechanical instruments, or in cases where the piece of iron already projects into the anterior chamber, thus exposing us to the risk of shoving it into this space when the ordinary instruments are used. The case in point might be illustrated by several examples, as eight such are at our disposition. I choose, however, one amongst them as particularly instructive. Here the magnet was not used, and no result was obtained. The entrance wound was enlarged, but the foreign body was so deeply seated that it could not only not be seized with the forceps, but was pushed on into the iris. The anterior chamber was abolished, and an incision was then made with the lance-shaped knife, followed by iridectomy. The operation, however, was not successful, and the foreign body remained in the eye.

On the other hand, in another case (Käge), the small foreign body was firmly imbedded in the deeper layers of the cornea, and, after several unsuccessful attempts at mechanical extraction, was finally pushed into the anterior chamber. Here, however, after incision of the cornea with the lance-shaped knife, the offending fragment was removed with the magnet through the wound thus made without further trouble. (S = 1.)

In another case (Albert Schmid) attempts at removal of the foreign body from the deep corneal layers by freshening

the wound and the use of the magnet were ineffectual. The lance was then pushed into the anterior chamber, and pressed against the posterior wall of the cornea, removal being meanwhile attempted with the spatula. At the critical moment of the perforation of the cornea, however, an involuntary movement of the lance almost allowed the foreign body to pass into the anterior chamber; this danger was averted by the timely use of the magnet, by means of which extraction was promptly effected. ($S = \frac{20}{60}$.)

When the foreign body is primarily deeply imbedded in the cornea, and projects far into the anterior chamber, its extraction may be undertaken directly from the latter, by introduction of the magnet through a lance incision.

Alb. Bratscher, twenty-three years old, while chopping wood a week ago, received a foreign body in the left eye. Attempts at extraction were made at other hands, but were without result. The foreign body is situated in the inner lower quadrant of the cornea, its point projecting into the anterior chamber. Attempts at extraction with the magnet were ineffectual, owing to the deep situation of the fragment. An incision was then made with the lance, at the inner border of the sclerotic, the knife passing in behind the foreign body as far as the border of the pupil. After withdrawal of the knife, the electro-magnet was passed into the wound until close to the foreign body, which was attracted by it and easily withdrawn. No prolapsus of the iris. Eserine. $S = 1$.

Our mode of procedure of course will be determined by the peculiarities of the case in question. In many cases where the splinter projects but slightly into the anterior chamber, it usually responds to the influence of the magnet held in front of the cornea, after removal of the superficial corneal layers, as demonstrated in Emil Meyer's case. In this patient the foreign body lay deep in the cornea, and could not be removed with the spatula. Hirschberg's case (Adam), where the point projected into the anterior chamber, is another of the same kind, as is also one mentioned by Kornstein of a foreign body piercing the cornea, but lying with the point directed forward, so that the forceps slipped off at each attempt to grasp it. The extraction was easily

accomplished with the magnet, held in front of the cornea after removal of the superficial layers. The magnet seems also indispensable when fine hair-like splinters are lodged in the cornea (Hirschberg's sixth case).

b.—Anterior Chamber.

Only two cases of foreign bodies situated exclusively in the anterior chamber, are at our disposition. In one of them (Steinmeyer) a fragment of iron lay at the bottom of the anterior chamber, and was at once washed out by the aqueous humor, upon peripheral incision with Gräfe's knife. Here the magnet seems not to have been absolutely indispensable. Extraction was at any rate rendered easier by it, than it would have been without. S = 1. The magnet gave no result in the second case (Heinrich Schmid); the wound was therefore enlarged, and the splinter drawn out with a pair of fine forceps.

The first of these two cases offers very little evidence of the value of the magnet, the second none at all. Nevertheless we hold it to be of real importance for the anterior chamber, especially in cases where the foreign body is first seen after the incision of the cornea, there being a liability of its disappearance in such cases (as noted by Hirschberg) and consequent impossibility of extraction by the ordinary instruments. The use of more or less pointed instruments is also much more dangerous than when the blunt magnet is used, there being great danger of traumatism, especially of the capsule of the lens, as well as that of plunging into the vitreous. The forceps should of course be near at hand in all cases, as is illustrated by case number two. They are particularly useful when the foreign body is firmly hooked into the tissue.

c.—Iris.

In the six years (1880–1885), there were observed in all six cases of metallic foreign bodies firmly lodged in the iris. The magnet was indicated in only three of these, and in but two did it yield any result: Elise Schmid, where the foreign body lay near the inner border of the pupil; and

Lee, where it was located at the inferior outer periphery of the iris. In the third case (Schötteldreyer), excision of the iris, including the foreign body, a piece of gun-cap, had to be resorted to. The first of the remaining three cases (Blattner) was one in which the foreign body had remained in the eye for fifteen years without reaction. At a later period, however, repeated imflammation had culminated in exciting an iritis. The foreign body was situated upon the lower part of the left iris, and not yielding in the slightest degree to the influence of the magnet, final resort was had to iridectomy. In the second case the fragment of iron had been *in situ* for a week, and was covered with a yellowish fibro-purulent exudation. Upon incision with the lance and discharge of the aqueous humor, the offending body appeared in the wound, and was removed with the iris forceps. The iris was reduced with the probe. In the third and last case (Wächter), the foreign body was very firmly imbedded, and was cut out together with the iris. This agrees pretty well with Hirschberg's results, where, in the most impartial manner, only one case of extraction by the magnet is reported against five others in which extraction had been accomplished by means of the forceps, before the time of the magnet; this, however, aided by excision of the iris.

It is thus seen that although the magnet is not effective in all iris cases, it is certainly indicated where the foreign body is not too firmly adherent, if only for the reason that injuries to the capsule, as well as excision of the iris, may thus possibly be avoided.

d.—Lens.

In three cases metallic foreign bodies were successfully extracted from the lens with the aid of the magnet:

In the first of these (Somini, twenty-seven years old) the offending body lay upon the posterior capsule, above and internal to the pupillary border. The next morning it had sunk about 3 *mm*, and was freely movable upon blinking the eyes. The lens is almost transparent as far as the wound of entrance in the anterior capsule. Ten days after, lower linear incision, iridectomy,

introduction of the electro-magnet, and successful extraction of the fragment. The lens was then scooped out with the spoon. Fingers at one foot, secondary cataract, discission, with $+\frac{1}{31\cdot2}$ $S = \frac{2}{10}$.

In the second case (Wehrli, forty-three years old), a sharp-edged foreign body was likewise imbedded in the posterior capsule, surrounded by an opacity of the cortex. Great opacity of the lens, suppurative iritis, and hypopyon three weeks after. A broad lance incision made below, with iridectomy and introduction of the magnet, whereby a small splinter of iron was received. As much of the lens was removed as was possible under the circumstances. Fingers at 8 feet and with cataract glasses, $S = \frac{1}{20}$. A subsequent small discission will be necessary.

The foreign body in the third case (Schlatter, thirty-seven years), had bored through the middle of the lower lid, pierced the sclerotic at the inferior corneal periphery, cut through the iris, and found final lodgment in the upper part of the lens. The fragment was successfully extracted with the aid of the magnet. Final result: 12.0 D; $S = \frac{1}{4}$. Complete absorption of the lens.

In another case the magnet was of use to a certain extent.

Melcher, twenty years old, while engaged in rivetting a boiler, received a flying splinter into the eye. The lens is characteristically opaque, and the foreign body, $2\frac{1}{2}$ *mm* long by 1 *m* wide, is lodged in the lower part of it. Movements of the hand are seen, and perception of light and projection are good. Corneal incision, and the capsule opened with introduction of the magnet. The fragment was thereby drawn towards the wound, but its removal with the magnet alone was impossible, owing to the liability of its recession, upon the passage outward of the soft masses of the cataract. A fine pair of forceps was therefore passed into the wound, and the fragment successfully extracted. The lens was then completely removed.

With $+\frac{1}{2\frac{1}{4}}$ Snellen $1\frac{1}{2}$

In another case however the action of the magnet was ineffectual.

Eichelberger, fifty years old. The foreign body entered the eye five days ago, and lies in the lens surrounded by a circumscribed opacity. The iris became implicated, and an abscess of the lens has formed in the neighborhood of the internal pupillary region. Owing to violent and continuous pain, an attempt at ex-

traction was made in three weeks, although the lens was not yet ripe. Incision with the lance-shaped knife at lower inner margin. Iridectomy. Capsule opened and magnet thrust into the anterior chamber, but without result. The foreign body however was washed out with the cortical masses, into the conjunctival sac, whence it was easily withdrawn with the magnet. The nucleus was removed by causing the wound to gape, and the cortex emptied as far as possible by rubbing with Daviel's spoon. Injections of a solution of salicylic acid into anterior chamber. After secondary iridectomy S for fingers = 4 feet was attained.

These cases of implication of so important an organ as the lens are not numerous, and may seem insufficient to demonstrate the superiority of the magnet as compared with the simple mechanical traction instruments. Hirschberg himself cites only two such cases (one of which, where extraction was accomplished by the magnetized lance, is very striking), while he notes eight cases of completely successful extraction, without the aid of the magnet. The literature upon this subject, however, shows thirteen other cases in which foreign bodies were removed from the lens with the magnet, six by Snell, three by Little, two by Hansen Grut, and Samelsohn and Haase one each. In all these cases the operation was crowned with success, except in one of Little's patients, where the metallic fragment was imbedded in the anterior capsule, and finally had to be removed with the forceps. On the other hand, this latter instrument would have been of no use in one of Hansen Grut's cases, as the base of the foreign body was firmly fixed, likewise in the anterior capsule, with only its point projecting into the anterior chamber. Another instance is Haase's case. Here the splinter was so firmly implanted in the tissues of the iris and substance of the lens, that the forceps was preferred to the magnet, and the latter only tried after repeated ineffectual attempts at removal with the former, the smooth surface of the fragment offering no chance for fixation with the forceps. The curved end of the magnet was then applied to the wound, when the piece of iron darted to it, and was removed easily. In Samelsohn's case the magnet was used because the foreign body could not be definitely located.

Snell, in referring to his cases, says the extraction might have been effected without the aid of the magnet, but that owing to the small size of the splinter, it would have been difficult and unsafe.

From these observations it would seem that the magnet is especially adapted to the removal of foreign bodies from the lens, from the fact that its loose and swollen tissue on the one hand, offers very little mechanical resistance to the action of the magnet, while, on the other hand, it is easier to find the fragment in the cloudy mass, and there is less danger of penetration into the vitreous, than with the forceps.

Passing the results of our experience in review, it is seen that extraction of foreign bodies in the anterior section of the eye is usually successful, by one method or the other, with fairly good results as regards the sight.

The electro-magnet, in a certain number of cases, is seen to be not necessarily indispensable; in others it is positively contra-indicated; while in a third class it does not fulfil the end in view. Cases belonging to this latter category comprise those in which the foreign body is very firmly imbedded in the medium surrounding it. This is less likely to be the case, as above noted, when the lens is implicated, its opaque swollen substance offering, least of all, mechanical resistance to the action of the magnet. On the contrary, when imbedded in the deep layers of the cornea, the obstacles to extraction are much greater; by removal of the superficial lamellæ of the cornea, however, the foreign body is made accessible to the action of the magnet. When the foreign body is lodged in the iris or in the capsule of the lens, it is more likely to resist the magnetic influence. In such cases recourse is had, more frequently, to the forceps.

The use of the magnet depends upon the circumstances of the case: the smaller and more brittle the fragment, the smoother and finer it is; the lesser the degree of fixation in the tissues, the greater the indications for its use. At any rate it can do no harm, and often offers such decided advantages over the ordinary traction-instruments, as to more than compensate for the extra trouble attending its use.

II.—POSTERIOR SECTION OF THE GLOBE.

A permanent result—that is, as far as removal of the foreign body and preservation of the shape of the eye are concerned—was obtained in only five of the eighteen cases of foreign body behind the posterior capsule of the lens subjected to the action of the magnet. Power of vision was preserved in only two of these, namely: counting the fingers at a distance of one metre. In a third case (Weber) there seemed to be some probability of restoration of the sight, to a certain extent, but observation of the case was not continued. The history of these five cases, briefly, is as follows:

A.—Permanent Results.

a.—With Partial Vision.

1. Baumann. Foreign body flew into the eye the day before while hammering a piece of steel. Left corneal wound about 2 *mm* in size, opposite the nasal border of the pupil. Lens already shows extensive opacity implicating almost the entire posterior cortex, opposite the corneal wound. The wound in the capsule of the lens runs from above internally, downwards and outwards. When the eye is moved, the greatest opacity is downwards and inwards; here and there Horner thinks he sees "a gleam" through the lens. Operation twenty-four hours after traumatism, with anæsthetics. Incision with Beer's knife between the internal and inferior recti muscles. The straight, pointed magnet introduced in the region of the posterior pole of the lens, but without result. The wide, curved magnet was now applied and twisted around so as to reach the neighborhood of the ciliary body and posterior pole of the lens. Upon withdrawing the magnet slowly, a small piece of iron, 3 *mm* long (4 *mgrm*), was extracted. No loss of the vitreous whatever.

Two weeks after, the eyeball is without injection. Anterior chamber deeper than that of right; partial, very intense cataractous cloudiness. No specks in the vitreous. Fundus invisible. Tension normal. Fingers at two feet. Projection very good. Discharged. Final result three months after: *The opacity of the lens has decreased* and concentrated itself near the wound. *Optic nerve visible with ophthalmoscope.* Fingers at one metre.

2. Ahrens. Traumatism of the right eye by a flying splinter

of iron. Linear wound about 8 *mm* long, 1 *mm* external to the border of the cornea, passing backwards. Foreign body *lies exactly behind the lens*, is shiny and about 5-6 *mm* long by 2 *mm* wide. Operation at once (same day) with the magnet. The bent magnet passed through the wound and near to the foreign body (*which is at once attracted by it*), *and then slowly withdrawn, bringing the fragment, solidly attached to it, with it* (12.5 *mgrm*). Wound sutured.

Three weeks after: Diffuse opacity of the vitreous in the centre, with numerous blood coagula floating around. *Above and externally, detachment of the retina.* Fingers at one metre. Patient discharged.

Final result, five months after: *Partial opacity of lens. Retinal detachment outward and downward.*

3. Weber, seventeen years old. Foreign body flew into the eye while chiselling. Perpendicular corneal wound, 5 *mm* long, opposite the torn nasal border of the pupil. Lens very much swollen; greatest opacity posteriorly and externally. Magnet extraction the following day. The wound of entrance was reopened by a vertical incision and widened. After four attempts the foreign body is finally brought to light (8 *mgrm*). It was apparently situated to one side and down in the depths of the vitreous. Cicatrization without any sign of inflammation. Pupil reacts well with atropine. Numerous lens masses in the anterior chamber. Perception of light and projection excellent.

Although this case was not followed up, there is no doubt that a certain degree of visual power, together with preservation of the form of the globe, has been obtained.

b.—Without Vision.

4. Laubi, ten years old. Yesterday, while cutting potatoes, received a foreign body into the right eye. Central corneal wound. There is a hole in the iris, below, at the border of the pupil. *Slight hypopyon.* Posterior and anterior capsular wounds are visible. In the depths of the vitreous is seen an opaque mass, which shines here and there. Foreign body lies at the inner lower side, between the vertical and horizontal meridians.

Twenty-seven hours after, incision with the linear knife at the inner side at R inferior, after first dividing the conjunctiva. After repeated introduction of magnet, foreign body is removed (2.5 *mgrm*). Catgut sutures.

Two days after: Depths of eye show a yellowish coloration. Copious purulent pupillary exudation. The wound in the lens is considerably infiltrated and yellow. Discharged in three weeks. Final result, six weeks after: Phthisis bulbi; occlusion of pupil; deep anterior chamber; amaurosis.

5. Surbeck, nineteen years old. Received foreign body into right eye while chopping. Corneal wound crosses the centre, a little under and somewhat external to it. Iris very much discolored; hypopyon. Conjunctiva of both the eyeballs, and lid already œdematous. The next day, incision of the sclerotic with Beer's knife between the internus and superior recti muscles. Introduction of magnet. Fragment of iron extracted upon the second trial (5.5 *mgrm*).

Following day: Chemosis, but not marked; painful; subsequently decreases gradually.

Discharged three weeks after. Eye movable.

In all of these five cases the operation was executed under relatively favorable circumstances, not later than the day following the traumatism in any case. The foreign bodies were small, the weight of the largest being only 12.5 *mgrm;* they were situated in the anterior section of the vitreous, the path leading to them being consequently relatively short; and finally, in Cases 1 and 2, in which a certain amount of visual power was obtained, the intruding fragment could be approximately located with the ophthalmoscope. These two cases may therefore be classed with those cases of primary extraction of McKeown (1 and 8), Hirschberg (12 and 24), Lloyd Owen, Hansen, Krenchel, Jany, Fränkel, Rheindorf, Mules, Aub, E. Meyer, and Fröhlich,[1] in all of which the metallic foreign body was visible in the anterior region of the vitreous, or, at least, was presumed to be there for good reasons, and in all of which a greater or lesser visual power was obtained.

In both of the cases, however (4 and 5), where the operation was delayed until twenty-four hours after the traumatism, and inflammatory phenomena (hypopyon) were already manifest (Laubi and Surbeck), namely, the presence of pus in the vitreous (Laubi), a moderate phthisis resulted,

[1] *Klinische Monatsbl. f. Augenheilk.*, Bd. xxiii., S. 349.

and the sight could not be restored. The cases of Hirschberg (16), Krenchel (3), Rheindorf (1, 2, 4), Hjort (2, 5), Pagenstecker, Krebs, Hansen-Grut, Knapp[1] (2 cases), and Dufour[2] (fragment of iron 1 *cm* long), belong to this category; as well as Rheindorf [8 and 10 (225 *mgrm*)], which, although operated at once, showed no perception of light from the very beginning.

B.—*Temporary Results.*

In two other of the eighteen cases, although momentarily successful, enucleation of the implicated eye was subsequently inevitable. The histories are as follows:

6. Weidmann. Received a chip of iron into the right eye, while chiselling. Prolapse of the iris at external inferior border of the cornea. Blood in the wound, and in the depths of the anterior chamber. Iris bulging very much towards the wound in the cornea, which is about 3 *mm* long. The external equator of the lens is easily visible, and uninjured. The depths of the vitreous filled with gray masses. Extraction with the magnet on the third day. Small flap incision with Gräfe's knife, without anæsthesia; a not inconsiderable loss of the vitreous followed immediately after, owing to the uneasiness of the patient. Upon the second introduction of the magnet, an irregularly angular piece of iron was drawn out, weighing at least 0.2 *grm*, and about 2 *mm* square. Excision of the protruding shreds of the iris; 2 per cent. carbolic-acid solution; wet salicylic-acid dressing.

Three days after, *plastic purulent cyclo-choroiditis*, and subsequently *occlusion of the pupil; purulent pupillary exudation. Loss of perception of light.* Finally, formation of an abscess about the size of a pea, at the site of the wound of extraction. Ciliary injection. Enucleation.

7. Bachmann. While hammering, a splinter of iron flew into the eye. Linear perforating wound of the cornea, 1 *mm* long. Traumatic cataract. Foreign body not visible. Magnet-extraction the following day: the straight, pointed magnet was pushed through the cornea and lens into the eyeball and then withdrawn, but without result; a second attempt was likewise unsuccessful. A wide-curved magnet was now passed in and moved around in

[1] American Ophthal. Society, July, 1885.
[2] *Révue médicale de la suisse romande*, No. 7, 1885.

the globe; upon its withdrawal, the foreign body, about 5 *mm* long, was found attached to it. During the operation some of the substance of the lens was lost, and there was also some prolapse of the vitreous. On the sixth day, pronounced chemosis. Three days after, paracentesis of the anterior chamber. The swollen lens substance being emptied, some pus is visible in the vitreous. Seven weeks after, eye irritable and painful. Enucleation.

In the first of these cases, the weight of the foreign body was at least 200 *mgrm*, and therefore belongs to the category of the *excessively large* (Hirschberg), *even shortest sojourn* of which (according to this author) *renders the attainment of visual power impossible, and the preservation of the shape of the eye very questionable.* More than this, the operation did not take place *until the third day*, and was accompanied with *considerable loss of the vitreous body.* The second case seemed more favorable; the weight of the foreign body was only 6 *mgrm*, and successful extraction was accomplished on the following day, in spite of the fact that the foreign body could not be seen, or exactly localized; *repeated exploratory searching was required, however.* At first there were no signs of inflammation; these manifested themselves nevertheless—possibly owing to the exploration of the space of the vitreous—on the sixth day after the operation, and led to subsequent enucleation.

The same result was obtained in the cases of McKeown [2 (150 *mgrm*)], Hirschberg (17), with advanced purulent infiltration of the vitreous, Hirschberg (25, 26, and 27), in which the operation was done early; the weight of the foreign bodies 500, 240, and 200 respectively, of Rheindorf (3), with pus in the anterior chamber, chemosis and only quantitative perception of light, and (6) with advanced suppuration, S = 0 and 200 *mgrm* weight.

Furthermore, Krebs-Lorentzen's case (4), and the nine cases of Aub, and four of Knapp.[1]

C.—Complete Failure.

In eleven of the eighteen cases the magnet operation gave no result whatever from the very beginning. Two of

[1] Bei Hirschberg, u. a. a. O.

these, after several days had elapsed, showed no signs of inflammation, but the foreign body could not be located, and attempts at extraction were without result, for some unknown reason. These patients were discharged with some remaining visual power and no signs of irritation. The histories are as follows:

8. Steinmann (21 October, 1880). Foreign body received into right eye while chopping on the railroad. Crescentic wound, 2 *mm* long, 2½ *mm* distant from the corneal border, upwards and outwards. Corresponding to this is a vertical gaping wound, 2 *mm* long, in the middle of the iris; this part of the iris is adherent; peripheral traumatism of the lens; incipient cataract; fingers at 5 feet. Opthalmoscope: The lens is not sufficiently transparent to distinguish the details of the fundus, still considerable red light is present; projection absolutely good. Operation with the electro-magnet on the fourth day with a view to bringing the foreign body into sight; no visible change, excepting a twitching sensation in the eye upon closing the current. Sent home with an occlusion bandage for several days, and has never returned.

9. Keller (March 28, 1881). While sharpening some instrument a foreign body flew into the eye. Central corneal wound; perforation of the capsule of the lens at its centre; traumatic cataract. Pupil dilated with atropine, but nothing can be seen. Perception of light and projection good. Nine days afterwards: Extractio lentis temporalis as usual; prolapse of the vitreous. In spite of repeated introduction of Fröhlich's electro-magnet into the eyeball, no result is obtained. Three weeks afterwards, fingers at 5 feet, with cataract glasses. About one month after, quantitative perception of light. Outward and downward projection is wanting.

Similar cases are Hirschberg's (29 and 30) and Dufour's (3 and 4)[1]. Attempts at magnetic extraction were likewise unsuccessful in three other cases, and enucleation was afterwards performed.

10. Hänseler (19 November, 1880) gives history of having received a piece of steel into the eye five days ago. Chemosis; pupil irregular and drawn in towards the wound; hypopyon; a

[1] Hirschberg, u. a. a. O.

cicatrix about 2 *mm* long in the upper limbus of the cornea. Lens shows cataractous opacity, especially at upper part. Opthalmoscope gives no result. The lower part of the field of vision is lacking; foreign body is therefore situated in the upper part of the vitreous. Attempts at extraction with the electro-magnet are fruitless. Enucleation.

11. Bühler (September 7, 1882). Flying splinter from the hammer received in left eye. Following day, oblique incision in the direction of the wound; most of the lens is emptied; repeated introduction of the magnet without response; the prolapsed vitreous lopped off. Eyeball very sensitive to pressure. Enucleation four days after.

12. Nussberger. A piece of iron flew into left eye while casting, on January 29th. February 1st, the cornea and lens are perforated, as seen by inspection of the wound, 1 *mm* in length. A small shred of the vitreous body hangs from the somewhat swollen lips of the corneal wound, which is situated opposite the external border of the pupil. The cornea itself shows a diffuse opacity. The anterior chamber is smaller than on the right side, without blood; iris discolored and muddy. Base of the eye is clouded over. Visual power reduced to almost nothing. Pain and injection of the conjunctiva are relatively slight.

The pupil responds pretty well to atropine; several flakes of cortex are seen in the depths of the anterior chamber; cataract completely developed; fingers at one foot; projection good. An aperture is made for the introduction of the magnet, with a Beer's knife, incision lying between the insertion of the external and inferior recti muscles. Attempt at extraction was a failure, however. The patient complains of a good deal of pain after the operation, which is somewhat relieved by ice.

February 2d.—Reappearance of pain.

February 3d.—Conjunctiva shows slight chemosis, and towards evening swells up greatly.

Panophthalmitis. Poultices; morphine; chloral.

February 13th.—The panophthalmitis has somewhat subsided. The eye is less painful.

February 16th.—Enucleation.

Unfortunately these three eyeballs, as well as the reports of the sections, are missing. *The cause of failure is therefore unknown.* It is possible that a foreign body would not

have been found in the enucleated globe, as was also the case with Hirschberg (23 and 31).

The causes of failure in the two following cases, however, are very plausible.

13. Stulz (July 16, 1883), while standing about four feet away from a man engaged in chiselling, was struck in the right eye by a flying chip. Counts fingers at two feet. The wound of the cornea begins 2 *mm* from the inner corneal border, and, describing a concavity upwards, reaches to the centre. There is a corresponding rent in the iris. Lens swollen and cloudy; a shred of the vitreous hangs out of the wound. The same evening repeated attempts at extraction through wound in the cornea were made with the magnet, but were unsuccessful. Chemosis. Some indication of panophthalmitis. *Enucleation. The foreign body lies very solidly imbedded in the sclera, somewhat under the optic nerve, and is quite large in size.*

14. Strasser (June 24, 1885). About four weeks ago the patient got something in his left eye while watching some iron-workers. A fine cicatricial point of entrance is found near the inner border of the cornea, and is tinged with blackish coloring. Slight opacity of the lens, especially at anterior pole. Funnel-shaped detachment of retina with numerous spots. *The foreign body is low down and glistens visibly; very movable*, perhaps between retina and choroid. Tension decreased. Movements of fingers externally only. An *unsuccessful* attempt to remove the foreign body is made with the magnet. Point of incision of the sclera between internal and inferior recti muscles. The patient was at once chloroformed,and the left eye *enucleated. Dissection of the eyeball reveals the foreign body solidly planted in the retina; it cannot be removed even when the magnet is laid directly upon it. Upon raising the magnet, the whole retina is drawn with it.*

Such cases, in which the foreign body is firmly wedged into the membranes of the globe, and where, of course, the magnet is powerless, are comparatively not so rare, and are even a frequent cause of failure. In four of the twelve (28, 32, 33, and 34) failures in Hirschberg's twenty-four cases of magnet operation in the posterior section of the eyeball, a similar implication of the membranes of the eye is noted. Moreover we find nine such, described by Snell,

Glascott (3), Lloyd Owen, Bronner and Appleyard, Schiess-Gemuseus (2), Hansen-Grut (8), Samelsohn, Dufour,[1] and Galezowski.[2]

In the following case the implantation was less solid, and therefore there may have been other circumstances which contributed to frustrate the action of the magnet.

15. Meyer (June 21, 1881). Perforating wound of cornea and lens. Patient says that a piece of iron struck him in the eye half an hour ago. Atropine immediately, but no dilatation of the pupil; the wound was then enlarged with the narrow knife and the electro-magnet introduced through the wound, but unfortunately without extraction of the splinter of iron, and *it seems probable that no such body is present in the eye.* On the tenth day the corneal wound is infiltrated, and pus is noted in the anterior chamber. Perception of light and projection bad. Enucleation.

Four years after, the globe is subjected to a careful examination, and now *an extremely small metallic splinter is found in the choroid at the most posterior section of the eyeball; it is also slightly imbedded in the sclerotic*, and required considerable teasing and detachment of the membranes before it was finally dislodged.

It is possible that in this case the insertion of the foreign body, which was not absolutely solid, was not the sole cause of failure, but that its remoteness (in the most posterior section of the globe) from the magnet at the corneal wound contributed to produce this effect.

In the following case, operated at an early date, it is not positively certain whether the foreign body was solidly imbedded in the membranes of the eyeball from the first, thus affording a resistance to the action of the magnet, or whether it was subsequently capsulated by a later choroiditis and thus held fast. Enucleation was not performed until several weeks had elapsed.

16. Niggli (May 5, 1882). While hammering tin, a foreign body flew into the right eye, probably from the hammer. Chemosis. Hypopyon.

A wound 5 *mm* long in the neighborhood of the external border of the cornea, and a large hole in the iris corresponding to this.

[1] *L. c.*

[2] "Sur l'emploi de l'aimant." Paris, 1885.

Pupil very irregularly dilated. There still remains a little red light in the eye. Projection good. Fingers are counted at nine or ten feet. Hypopyon evacuated the following afternoon through the wound. In the evening the anterior chamber is abolished; the wound enlarged downwards with the scissors and the electro-magnet passed in repeatedly, deep into the globe, in the direction of the supposed foreign body, but without result.

Excessive chemosis appears the next day, but disappears later on.

Perception of light and projection good.

Panophthalmitis three weeks after. Partial evacuation of the eyeball; subsequently enucleation. The foreign body weighs 0.031 *grm* and was found in the lower part of the globe, in the neighborbood of the equator, firmly capsulated between the choroid and sclerotic.

On the other hand, subsequent formation of connective tissue and capsulation were undoubtedly the cause of failure in the following csse.

17. Dunke. Traumatism of the right eye, while chopping, two weeks ago. The foreign body has pierced the lower inner border of the cornea. Iris wound. Hypopyon. Foreign body is visible with the ophthalmoscope, inwards and downwards in the vitreous, not far from the pupil. Enucleation is proposed. Incision in the sclerotic downwards and inwards, and vain efforts to extract with the magnet. The eye then enucleated.

The foreign body lies close to the retina and is connected with the latter by a fine thread. After opening the globe, it could not be removed with the magnet. During the attempts at extraction the magnet must have passed close by the foreign body.

Burchardt's case (Hirschberg, page 86) is quite analogous to this one. In these two latter cases, the question quite naturally arises as to what extent the products of inflammation hindered the action of the magnet. This would, of course, depend upon the consistency of these products. According to Knapp, fluid pus does not interfere with the action of the magnet. Should, however, the pus be capsulated by a membrane, be it ever so thin, this would undoubtedly be an obstacle which would have to be overcome (Knapp). When the foreign body is surrounded by tough,

coagulated fibrinous masses, the task of extraction with the magnet is rendered more difficult, if not impossible. Such cases, resulting in failure, are those of Hirschberg (18), Hansen-Grut (9, 10, 11), Aub, and Galezowski[1] (3). The importance of this point is recognized by Knapp and Hansen-Grut as a reason for early operation, before the exudation becomes too solid, or complete capsulation takes place. A similar case of our own may be used in illustration.

18. Braunschweiler (August 19, 1883). Struck in the eye with a small piece of steel. Horizontal wound of the cornea, 3 *mm* in length, and under the centre. The region of the wound is clear. Moderate pericorneal injection. Pupil contracted; the cortical substance oozes through the latter into the anterior chamber. Iris hyperæmic. The eyeball is sensitive to pressure. Fingers at two feet. Atropine. Fingers now at six feet. There is a gaping tear in the anterior capsule, passing inwards and upwards. Distinct breaking up of anterior cortex. The posterior cortex is opaque, especially at the point of passage of the foreign body through the posterior capsule. Operation with the magnet on the third day: Conjunctival flap between internal and inferior recti muscles. Incision in the sclerotic parallel to the course of the muscle. The magnet is introduced three times without effect. No loss of the vitreous to speak of. The following day, slight chemosis, and great irritation. Pupil contracted.

Two weeks after: Great irritation. Pain on pressure. Perception of light at one foot. Enucleation. The section of the eyeball demonstrates a large focus of pus in the internal lower region, in the middle of which, close to the wall of the globe, lies a splinter of iron, about 2½ *mm* long and 1 *mm* wide, surrounded by a mass of fibrinous exudation. There are no scars in the walls of the eyeball, except those made by the attempts at extraction. The vitreous is dark and fluid—likewise the remains of the cataract.

In this case, however, the foreign body was supposed at first to be located above and internally, and the magnet was primarily introduced in that direction. The capsulation may have taken place subsequent to the operation, as enucleation was not performed until two weeks after.

[1] *L. c., Archiv für Augenheilkunde*, xviii.

According to our experience, and reviewing the observations of others, there are **two conditions absolutely necessary for the successful extraction of bodies situated in the posterior portion of the globe,** viz.:

1. The foreign body must be freely movable; and 2, the distance to it must be short.

When surrounded by exudative masses, firmly imbedded in the membranes of the eyeball, or enclosed in a connective-tissue capsule, the foreign body is immovable, and therefore inaccessible to the magnet. This immobility is the most frequent cause of failure, as was undoubtedly the case in four (13, 14, 16, and 17) [and possibly in two (15 and 18) others] of our eleven cases of **failure**; also in seven of Hirschberg's unsuccessful cases, and in fourteen of the remaining twenty-seven cases, mentioned in the literature of the subject—**in a word, fifty per cent. of all the cases.** The advantages of early operation are quite obvious, as very often subsequent capsulation of an originally movable foreign body frequently takes place.

The great distance of the foreign body from the magnet was the cause of failure in Vossius-Hippel's case, and possibly also in our own case (Meyer), and perhaps in Hirschberg's (No. 20). Foreign bodies, situated in the anterior and central portions of the vitreous, when not exactly localized, are more accessible to the action of the magnet than those lying posteriorly or deep downwards and sidewards. It is of primary importance, therefore, to first localize the foreign body as precisely as possible, in order to get at it in the shortest and most direct way, and bring the point of the magnet in direct contact with it, thus rendering even bodies in the most posterior regions accessible to magnetic influence. To what extent the existence of both of these factors—*mobility of the foreign body and its correct localization*—may contribute to the complete success of the magnet operation, even to the attainment of a satisfactory visual power, is shown by the cases of secondary and tertiary extraction of Hirschberg, Fränkel, Alexander, Schiess-Gemuseus, Jany,[1] and others.

[1] *Deutsche med. Wochenschr.*, 1885, No. 47.

Important points, as far as prognosis is concerned, are whether inflammatory phenomena, such as the presence of pus in the vitreous, have manifested themselves: whether the size of the foreign body exceeds a certain limit (200 *mgrm*); whether there is presence or absence of perception of light. The existence of any one of these three unfavorable symptoms renders the prognosis as to visual power very dubious, even though extraction be completely successful. There is still some chance of preservation of the eye, but in many cases subsequent enucleation becomes necessary.

When there exist advanced inflammatory manifestations and deficient localization, we are sometimes quite justified in an expectant treatment, for the foreign body may become visible owing to absorption of the inflammatory products; and even if capsulated, may remain for a longer or shorter time within the eye without reaction or without interference with its function.

To return to the question of the magnet operation as applied to the posterior region of the globe, we find the following results have been obtained:

Of the 154 cases known to literature, a more or less satisfactory visual power was obtained in 47–48 cases = 30⅓ per cent.

[Hirschberg 3 cases, Horner 2 or 3 (Weber's case ?)], while in 16 other cases, or 10⅓ per cent., almost normal acuteness of vision was attained.

The form of the globe without sight was preserved in 27 cases = 17½ per cent. (Hirschberg 3 cases, Horner 2). Whether the cosmetic results thus obtained were satisfactory or not is questionable, but this seems to have been the case with about twelve of the patients.

Four other cases were not followed up, and it is not known whether enucleation was necessary at a later period.

In 16 cases subsequent enucleation was inevitable = 10⅓ per cent. (4 by Hirschberg and 2 by Horner).

Finally, in 55 cases = 37 per cent., the magnet operation was unsuccessful from the very beginning (14 by Hirschberg, including Burchardt's case, and 11 by Horner).

ON DR. RANDOLPH'S CRITICISM OF MY EXPERIMENTS ON SYMPATHETIC OPHTHALMIA.

By H. GIFFORD.

IN the article of Dr. Randolph, on "Sympathetic Ophthalmia," in the last issue of the ARCHIVES, the experiments in which I traced in rabbits the anthrax bacillus from one eye to the other, are referred to in a way that is calculated to discredit them entirely with those who have not recently read my paper carefully. He says (page 211): "It is strange that Dr. Gifford should have used the anthrax bacillus for such experiments. He could not have selected an organism which would have given him results less valuable to the history of the subject." Had Dr. Randolph read my article with care he could hardly have made such sweeping and discrediting statements, for I there (these ARCHIVES, xv., 3, p. 284) gave the particular reasons which led me to select the anthrax bacillus, after having failed to confirm Deutschmann's results with the pus-cocci. Everybody knows that, in most cases, when an animal dies of generalized anthrax, the blood-vessels throughout the body, including the eyes, of course, contain the bacilli. Allowing for this I hoped, nevertheless, that as the anthrax causes comparatively little of the emigration of leucocytes which hindered the progress of the pus-cocci, the bacilli might make the passage through the lymph-spaces by way of the cranial cavity to the second eye, before the animal was killed by the general infection; and this really occurred in three out of twenty-five cases. In two of these cases no bacilli were to be found anywhere in the blood-vessels; but

they were present in immense numbers in the lymph-spaces leading along the retinal and orbital vessels from the vitreous to the brain, and from there down through the intervaginal space of the opticus to the suprachoroidal space of the second eye. The twenty-two rabbits in which the experiment failed constitute an ample control, for though they died of anthrax, and the bacilli were found in the blood-vessels of both eyes, absolutely no free bacilli were found in the cranial cavity or intervaginal and suprachoroidal spaces of the second eye, as death occurred before they had passed more than a short distance into the orbit from the vitreous of the first eye.

If any observer should find as the result of an ordinary subcutaneous anthrax-inoculation, the condition of the lymph-channels of the optic nerves and orbital tissue, which I have figured and described as evidence of the passage of bacilli from one eye to the other, the value of my experiments would of course be impaired; but I have not been able to make any such find myself, nor do I know of any one that has.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FOURTH QUARTER OF THE YEAR 1887.

By H. MAGNUS, Breslau; C. HORSTMANN, Berlin; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

S. M. Burnett, Washington; Dantone, Rome; Hirschmann, Charkow; E. Marckwort, Antwerp; P. v. Mittelstädt, Metz; Werner, Dublin; C. H. A. Westhoff, Amsterdam; Schiötz and Ole Bull, Christiania, etc.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

416. Howe. Increase of blindness in the United States. *Amer. Jour. Ophth.*, Sept., 1887.

Howe (416) found that while from 1870 to 1880 the population of the United States has increased 30 per cent., the number of the blind has increased 140 per cent., the number decreasing from the East to the West, but increasing from the North to the South. They have cost the United States during 1887 more than 25 millions of dollars. The American Ophthalmological Society appointed a commission to consider the introduction of rational methods of preventing blindness.

b.—STATISTICAL PAPERS.

417. Annali di Statistica. Inchiesta statistica sugli Instituti dei sordomuti e dei ciechi. Roma, Pasqualini e Zappa, 1887.

418. FIEUZAL. Mouvement de la clinique pendant le 3e trimestre 1887. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts*, July–Sept., 1887.

419. FIEUZAL. Revue clinique du dernier trimestre. Do.

According to the statistics published by the Italian Department for Commerce and Agriculture (417) there were in Italy 21,718 blind persons when the census was taken in 1881, equal to 7.73 to 10,000 inhabitants against 10.5 to the same number of inhabitants, the ratio found at the census of 1871. The lowest percentage was found in the mountainous regions (5.7 : 10,000), the highest on the island of Sardinia (21.1 : 10,000). DANTONE.

FIEUZAL (418) treated, during the third quarter of the year 1887, 2,791 new patients, and performed 422 operations, among them 143 on the lens, 43 iridectomies, and 30 enucleations.

V. MITTELSTÄDT.

FIEUZAL (419) treated, during the last quarter of the year 1887, 2,205 new patients, of whom 310 were admitted to the hospital.

V. MITTELSTÄDT.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

420. DEUTSCHMANN. On sympathetic ophthalmia. Aerztl. Verein zu Hamburg, meeting of Oct. 25, 1887. *Deutsche med. Wochenschr.*, 1887, p 73.

DEUTSCHMANN (420) considers sympathetic ophthalmia an infectious process, which is transmitted from one eye to the other through the optic nerve. In the discussion Salomon denies the general admissibility of this statement. Deutschmann seeks to break the force of the objections to his theory by distinguishing between sympathetic irritation and sympathetic inflammation, the former may be due to a reflex irritation, the latter always to infection.

421. GAYET. Recherches expérimentales sur l'antisepsie et l'asepsie oculaires. *Arch. d'ophth.*, vol. vii., 5.

422. FIEUZAL. De la révulsion et de la dérivation par les émissions sanguines dans les maladies des yeux. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts*, vol. v., 3.

423. LANG. On the insertion of artificial globes into Tenon's capsule after excising the eye. *Trans. Ophth. Soc. Unit. Kingd.*, vol. vii., p. 286.

424. MAZZA. Le iniezioni ipodermiche di calomelano. Re-

cerche anatomiche e sperimentali come contributo alla etiologia del pus. *Ann. di ottalm.*, vol. xvi., 4, p. 283.

425. PANAS. Quelques courtes remarques au sujet du travail du Dr. C. Hess de Prague sur la cataracte naphthalinique. *Arch. d'ophth.*, vol. vii., 6.

426. ROLLAND. Explication expérimentale de l'immunité apanophthalmique des grains de plomb. *Rec. d'ophth.*, Sept. 1887, p. 530.

In this very interesting paper GAYET (421) reports at length his investigations on the micro-organisms which may be found in the conjunctival sac in spite of the most thorough antiseptics. With the aid of pure cultures and inoculation of rabbits, Gayet tries to determine the nature and importance of the various kinds of micro-organisms, and from the operative results obtained shows their influence on the course of healing of an extraction. In the first series of 178 cataracts the whole body was first thoroughly cleansed, also the mouth and nose, and then the conjunctival sac was washed out in the course of a few hours with a concentrated solution of boric acid or with sublimate 1:6,000 from four to twenty-nine times, the eye being then bandaged aseptically. Just before the incision, and after another cleansing of the sac, some of the liquid from beneath the upper lid was transferred to gelatine, all antiseptic precautions being observed, which was followed in 139 cases by the development of micro-organisms, while in 39 this did not take place. In a second series, treated only with boric acid, micro-organisms were found in 32 cases. Only 16 % were free from germs among the men, 38 % among the women. Among 213 cases there were micro-organisms therefore in 171, nevertheless infection took place in only 13 cases. For details, see the original. The author comes to the following conclusions: 1. The majority of eyes contain micro-organisms beneath the lids, no matter whether the persons are inside or outside a hospital. 2. The antiseptic remedies employed seemed to have only a slight effect. We are never certain of having destroyed all the germs. 3. Several varieties are found—staphylococcus aureus, citreus, and albus, also bacilli and bacteria. 4. Not all the germs are pathogenic. 5. Among the cocci some are pathogenic, as they were found in eyes in which a purulent inflammation had developed, and the inoculation of rabbits with pure cultures also produced an inflammation. 6. Some of the cocci are not dangerous, as inoculation with them did not cause suppuration. v. MITTELSTÄDT.

The abscesses caused by injections of calomel at the temple (0.30 pro dosi in glycerine), a favorite remedy of Italian physicians against iritis and iridocyclitis, were investigated by MAZZA (424). He found they contained pieces of tissue, cellular elements resembling leucocytes, but often larger, and occasionally cocci. The latter are not pyogenic, neither is the pus of the abscess. These injections always produce an abscess, in spite of the strictest antiseptic precautions. There are no constitutional symptoms.

DANTONE.

ROLLAND (426) finds that panophthalmitis does not follow the entrance of lead shot into the eye because the shot generally penetrates under aseptic conditions. MARCKWORT.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

427. ARMAIGNAC. Blépharostat fixateur du Dr. H. Armaignac. *Rev. clin. d'ocul.*, Nov., 1887.

428. JESSOP. New ophthalmoscope for students and practitioners. *Brit. Med. Journ*, Oct., 1887.

ARMAIGNAC (427) has devised a contrivance to be attached to the speculum in those cases in which assistance cannot be had. This little fixation-forceps seems to resemble the serres-fines. The conjunctiva is seized with it, the speculum introduced, and the forceps attached to a little plate on the middle of the lower branch. In detaching it it is only necessary to open the branches of the forceps, when it can be removed with the speculum.

V. MITTELSTÄDT.

b.—REMEDIES.

429. ALT, A. The bichloride of mercury in the treatment of external diseases of the eye. *Amer. Four. Ophth.*, Nov., 1887.

430. CASTALDI. Sulla utilità delle pennellazioni di soluzioni di sublimato corrosivo nelle lesioni lupose della cute.

431. JACKSON, E. When and how to use mydriatics in the eye. *Ophth. Rev.*, Aug., 1887.

432. SCHWEINITZ and HARE. Contribution to the physiological action of hydrobromate of homatropine. *Med. News*, Dec., 24, 1887.

ALT (429) uses for external application the mercuric bichloride in strength varying from 1 to 2,500 to 1 to 10,000. He has found

it useful in simple, acute, and chronic conjunctivitis, and in the purulent forms, also in cases of diphtheria of the conjunctiva; he has not found it useful in phlyctenular ophthalmia, nor in ulcers of the cornea, nor in any form of keratitis. BURNETT.

CASTALDI (430) reports on four cases of extensive lupous ulcers, which had also attacked the lids, but which completely cicatrized under the application of a 1 % solution of sublimate, after all other remedies had failed. He then discusses at length the histological structure of the lupus nodules and their analogy to those of tuberculosis. DANTONE.

JACKSON (431) discusses the application of mydriatics. If it is merely desired to dilate the normal pupil, he prefers to use cocaine (1 : 25), because it produces the greatest mydriasis and because its action can be neutralized soonest by myotics. Atropine or duboisine are indicated when the accommodation is to be paralyzed completely and for some time, while for a temporary paralysis for the purpose of diagnosis homatropine (1 : 50) is preferable. For inflammatory conditions of the iris atropine (1 : 60–120) is the best remedy.

SCHWEINITZ and HARE (432) confirm the results of the experiments of Risley and Jackson as to the effects of hydrobromate of homatropine on the eye. They consider it reliable as a paralyzer of accommodation for testing refraction. A drop to be put in the eye at bedtime and every fifteen minutes for an hour or an hour and a half the next morning just before the examination is to be made. The action on the accommodation begins to pass away in an hour, and is lost in thirty-six hours. BURNETT.

IV.—ANATOMY.

a.—GENERAL ANATOMY.

433. FITZGERALD. Microphthalmus congenitus. Acad. of Med. in Ireland, Dec. 2, 1887. *Centralbl. f. prakt. Augenhk.*, 1888, p. 21.

434. NEARY. Anophthalmus duplex congenitus. *Ibid.*

435. MAPOTHER. Eyeless fishes. Acad. of Med. in Ireland, Dec. 2, 1887. *Centralbl. f. prakt. Augenhk.*, 1888, p. 20.

NEARY (434) reports a case of congenital double anophthalmus. Lids and orbit normal. In connection with this Story remarks that these cases are very rare and difficult to explain; the reviewer, however, must deny the latter assertion, as the paper by

Arlt has fully explained the development of anophthalmus, so that no further difficulties exist on that subject.

MAPOTHER (435) found in five eyeless fishes from the mammoth caves of Kentucky no indications of a visual organ or optic nerve. There was, however, a well developed ramus ophthalmicus in the region where the eye should have been. The power of hearing was markedly developed in these animals.

b.—ORBIT, CONJUNCTIVA, MUSCLES.

436. DELBET. Note sur les nerfs de l'orbite. *Arch. d'ophth.* Nov.-Dec., 1887, p. 485.

DELBET (436) for a prize essay examined the nerves of a large number of orbits and found that they differed in several respects from the conditions usually accepted. He endeavored to ascertain the usual conditions in distribution, course, and anastomosis. He explains the difference between authors by assuming that the number of orbits examined by them has been too small. He describes in detail the arrangement of the sensitive and motor nerves and their anastomoses, and of the ciliary ganglion and its branches, taking into consideration the views of others and the conditions found by them. It is worthy of note that he considers Badal's operation (stretching of the N. infratrochlearis) impossible, as only the middle branch of its terminal branches can be reached. V. MITTELSTÄDT.

437. GALLENGA. Structure of the pinguecula. Congress of the Ital. Ophth. Soc., Sept., 1887. *Centralb. f. prakt. Augenhk.*, Nov., 1887.

GALLENGA (437) found in the pinguecula a duct lined with epithelium and extending inwards.

438. JESSOP. Abstracts of lectures on the intraocular muscles of mammals and birds. Lecture III. *Ophth. Rev.*, 1887, p. 315.

JESSOP (438) found that eserine directly irritates the muscular fibres, while atropine paralyzes them. Cocaine irritates the endings of the nerves and relaxes the muscular fibres.

c.—LENS AND VITREOUS.

439. HACHE. Sur la structure et la signification morphologique du corps vitré. Communication à l'Acad. des sci. *France méd.*, 1887, p. 1143.

440. HÄNSELL. Contribution à l'étude d'embryologie du

crystallin. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts.*, vol. v., 3.

HACHE (439) shows that the vitreous is a substance which can yield up its water and is then capable to a high degree of re-absorbing it. MARCKWORT.

HÄNSELL (440) describes the development of the lens fibres from his investigations of the eyes of animals. The change from epithelial cells to lens fibres takes place, as the author concludes from an observation of a traumatic cataract, by division of the nuclei and conversion of the chromatine into the achromatine substance which furnishes the material for the lens fibres.

V. MITTELSTÄDT.

d.—RETINA AND OPTIC NERVE.

441. KOSTENITSCH. The development of the rods, cones, and outer granular layer of the retina of the human embryo. *Inaug. Diss.*, St. Petersburg, 1887.

442. MAGNUS. Further contributions to the knowledge of the congenital grayish-white opacity surrounding the macula lutea. *Klin. Monatsbl. f. Augenhk.*, 1887, p. 391.

443. TARTUFERI. Sulla strato dei granuli interni della retina. *Giorn. della R. Accad. di Med. di Torino*, vol. l., 5, p. 242.

444. TARTUFERI. Sulla anatomia della retina. Torino, 1887.

KOSTENITSCH (441) arrived at the following results from his investigations conducted at the laboratory of Professor Owssjannikow: 1. The rods and cones develop from the protoplasm of the embryonic cells of the outer granular layer of the retina towards the end of the fourth month of uterine life. 2. In the outer granular layer of the human embryo there are supporting-cells besides the nuclei of the rods and cones. 3. The supporting-fibres of the retina subdivide into delicate threads, which end at the outer edge of the retina. 4. The differentiation of the outer granular layer, as well as that of the rods and cones, extends from the papilla to the periphery. 5. The retina of an embryo eight months old is almost complete in its structure and capable of perception of light. 6. In the cones of a new-born child there are prolongations and auxiliary bodies. 7. In the rods and cones axis-cylinders are indicated. 8. The macula lutea is not yet developed in the new-born. HIRSCHMANN.

MAGNUS (442) describes another case of grayish-white congen-

ital opacity around the fovea centralis; the pathological changes in this case, however, completely disappeared, so that the macula lutea finally presented a normal appearance. Lately Hirschberg has seen a similar case; Knapp and Goldzieher had previously verified the observation of Magnus.

TARTUFERI (443) reports in a preliminary notice that the majority of the cells of the inner granular layer of the retina contain a body resembling a pear, and that they possess an inner and an outer offset. DANTONE.

445. MAGNUS. A case of bilateral congenital microphthalmus with coloboma of the optic nerve of the right eye. *Klin. Monatsbl. f. Augenkk.*, 1887, p. 485.

446. MICHEL. On degeneration and decussation of the optic nerve. Jubilee-paper of the medical faculty of Würzburg University in honor of the 70th anniversary of Kölliker's birthday. Wiesbaden, 1887.

447. SIEMERLING. Case of gummous affection of the base of the brain affecting also the chiasma. A contribution to the knowledge of the course of the fibres in the optical conducting apparatus. *Arch. f. Psych.*, vol. xix., 2.

MICHEL (446) has again investigated the course of the fibres in the chiasma of man and various animals, and he concludes that in man total decussation takes place.

SIEMERLING (447) reports as follows on the course of the fibres in the optical conducting apparatus of man: the fibres which supply the lateral part of the retina, *i. e.*, essentially the fibres of the uncrossed fascicle, take a lateral course in the optic nerve, their greater part reaching the periphery, lying in the intraorbital part more below, but nearer the brain lying more on the outer side. In the chiasm the uncrossed fascicle lies laterally in the anterior part at the ventral surface, and then gradually changing to the dorsal position which it occupies in the posterior part. In the tractus the uncrossed fascicle occupies a central position, and never reaches the periphery.

V.—PHYSIOLOGY.

a.—GENERAL PHYSIOLOGY.

448. ADDARIO. On entoptic phenomena. Ital. Ophth. Soc., Sept., 1887. *Centralbl. f. prakt. Augenhk.*, 1887, p. 338.

449. SOUS. Vision binoculaire et refraction. *Rev. clin. d'ocul.*, Oct., 1887, No. 10.

ADDARIO (448) refers the erythropsia observed with closed lids to the blood of the latter; under certain conditions he sees a delicate network filled in with large round cells, which he ascribes to the ganglion cells of the retina.

SOUS (449) determined the refraction in 78 cases of H and 129 of M in monocular and binocular vision, and found it in the latter less in 54 and 117 cases respectively than in the former. In opposition to v. Reuss and Nagel he attributes this diminution of refraction to the convergence which takes place in binocular vision (at the usual distance of the test-types), whereby the rays of light fall obliquely upon the lens, and are thus less refracted than in seeing with one eye, when they fall perpendicularly upon the cornea. In exceptional cases the author thinks abnormal curvature of the cornea or the angle α may be the cause.

v. MITTELSTÄDT.

b.—LENS AND VITREOUS.

450. LEPLAT. Etudes sur la nutrition du corps vitré. *Ann. d'ocul.*, xcviii., p. 89.

451. MATTHIESSEN. Contributions to the dioptrics of the crystalline lens. III. *Zeitschr. f. vergl. Augenhk.*, vol. v., 2.

LEPLAT (450) injected iodide of potassium under the skin of rabbits, and after varying periods of time enucleated the eyes, froze them, divided them into 7 similarly situated pieces, and then determined chemically the amount of iodide of potassium they contained. Seven hours after the injection the eye contained most, and 38 hours afterwards he still found traces of it at the papilla. He concludes that the ciliary body secretes liquid, one part of which forms the aqueous humor, which leaves the eye through Fontana's spaces, while the other passes through the vitreous and escapes through the canalis centralis of the optic nerve.

MARCKWORT.

c.—RETINA AND CENTRAL ORGAN.

452. DENISSENKO. The importance of the changes which take place in the eye under the influence of light. *Wjestnik Ophth.*, 1887, Nos. 4–6.

453. VAN GENDEREN STORT. On the changes of form and position of the retinal elements under the influence of light and darkness. *Arch. f. Ophth.*, vol. xxxiii., No. 3, and *Extr. des Arch. Néerland. de science*, vol. xxi.

454. RAMPOLDI. Sul centro retrattore dei bulbi visivi nella rana. *Ann. di ottalm.*, vol. xvi., 4, p. 247.

DENISSENKO (452) sets up the following theory on the action of light on the eye: its action is partly chemical, partly physical. The former manifests itself by bleaching the visual purple and by the differentiation of the discs in the outer portions of the rods and cones. The latter the author would refer to a change in reaction, calling to mind the observation of M. Schultze, that this phenomenon takes place when the reaction is slightly acid. The mechanical consequences of the action of light consist in shortening of the rods and cones, displacement of the pigment to the membrana limitans externa, and enlargement of the retinal spaces (cavities). This dilatation produces a strong current of liquid (from the suprachoroid) and a movement of pigment towards the retina and between its elements, whereby the material decomposed by the action of the light is replaced. He confirms the observation of Engelmann that when only one eye is illuminated, movement of the pigment takes place in the other also, which he ascribes to transmission of the irritation. The changes in the rods and cones are due to direct action of the light. The current of liquid due to the action of light passes from the suprachoroid into the enlarged retinal spaces, which in men lie in the inner granular layer. The dilatation of the enlarged retinal spaces takes place by reflex action from the central nervous system. When the current of liquid passing inward is checked (for instance in choroidal affections), the pigment epithelium and the layer of rods and cones suffer and disintegrate. The latter undergo fatty degeneration or subdivide, become small and round. They are not replaced after being acted upon by light and are destroyed. HIRSCHMANN.

RAMPOLDI (454) has found the nerve centre governing the retraction of the frog's eye in the medulla oblongata at the edge of the fossa rhomboidalis. When mechanical or galvanic irritation is applied at this point, either one or both eyeballs are retracted, the former taking place when one of the lateral portions is irritated, the latter when the median portion is thus affected. Sometimes other movements also occur, but not constantly.

DANTONE.

Sections VI.–XI. Reviewed by DR. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

455. FANO. L'hypermetropie des petits enfants. *Journ. d'ocul. et de chir.*, Dec., 1887.

456. JACKMAN, W. T. On the eyesight in village school children. *Trans. Ophth. Soc. Unit. Kingd.*, vol. vii., p. 326.

457. REYMOND e BAIARDI. Sulla visione nell' astigmatismo. *Giorn. di R. Accad. di Med. di Torino*, vol. l., 5, p. 240.

458. RISLEY, S. D. Additional cases of hypermetropic refraction, passing while under observation into myopia. *Amer. Ophth. Soc.*, 1887.

459. SOUS, G. Vision binoculaire et réfraction. *Rev. clin. d'ocul.*, 1887, No. 10.

JACKMAN (456) examined 456 children in seven schools. In 6.5 % he found hypermetropia, in 2.17 % myopia, in 10.5 % astigmatism, and in 5.04 % anisometropia. There was color blindness in 1.7 %., insufficiency of the internal recti in 3.7 %, and strabismus in 2.8 %. E. WERNER.

RISLEY (458) observed in nine cases conversion of hypermetropia into myopia by way of astigmatic changes. All complained of asthenopic symptoms, and showed marked choroidal irritation and insufficiency of the internal recti. To prevent the development of myopia the ametropia must be corrected, even though the degree of astigmatism may be low.

VII.—LIDS.

460. DESPAGNET. Les poux des paupières. *Rec. d'ophth.*, 1887, No. 11, p. 674.

461. DEHENNE. Traitement de l'entropion par le thérmocautère. *Union Méd.*, 1887, No. 570.

462. MILLINGEN, E. VAN. The tarsocheiloplastic operation for the cure of trichiasis. *Ophth. Rev.*, 1887, No. 73, p. 309.

463. NOYES, H. D. Operation for the relief of entropium of the lower eyelid. *Amer. Ophth. Soc.*, 1887.

464. ORMEROD, J. A. Ecchymosis and œdema of the eyelids without obvious cause. *Trans. Ophth. Soc. Unit. Kingd.*, vol. vii., p. 101. Three cases.

465. PFALZ, G. On a method of operating for entropium and trichiasis. *Arch. f. Ophth.*, vol. xxxiii., 3, p. 165.

466. PHILLIPS, SIDNEY. Associated movements of upper lid with movement of eyeball. *Trans. Ophth. Soc. Unit. Kingd.*, vol. vii., p. 306.

467. RANDALL, B. A. A case of sarcoma of the eyelid, simulating a Meibomian cyst. *Amer. Ophth. Soc.*, 1887.

468. VAN DUYSE et CRUYL. Myxosarcome de la paupière supérieure. *Ann. d'ocul.*, vol. xcviii., p. 112.

469. WILLIAMS. Treatment of chalazion. *St. Louis Med. and Surg. Journ.*, vol. liii., No. 5.

In entropium of the lower lid NOYES (463) cuts a narrow piece of skin out of the base and attaches the free end of the everted flap to the freshened edge of the conjunctiva.

MILLINGEN (462) proposes a method of operating for trichiasis which abolishes the tendency of the conjunctiva to turn skin inward. He first makes the intermarginal incision according to Arlt, then transplants a piece of mucous membrane from the lips into the wound, and pulls the skin of the upper lid upwards with the aid of three sutures. PFALZ (465) makes an incision through the whole length of the lid, passing the knife in just above the insertion of the anterior row of eyelashes, holding the edge of the knife upwards and backwards, and then makes another, parallel to the former and about 3½ *mm* distant from it, and joining it at the ends with a sharp curve. The piece of skin thus circumcised with the muscle lying beneath it is excised. He then excises a wedge-shaped piece from the exposed tarsus, the blunt edge of which corresponds about to the greatest curvature of the tarsus, and then incises the conjunctiva in the middle of the wound to the extent of about 6 *mm*. After applying sutures he covers the wound with an iodoform bandage.

RANDALL (467) had operated twice upon a cyst which made the impression of a chalazion. A relapse occurred, so he extirpated the small tumor. Two years later there was another relapse, which necessitated the removal of the outer half of the lid. The tumor proved to be an encysted spindle-cell sarcoma.

VAN DUYSE and CRUYL (468) describe a case of myxosarcoma of the upper lid occurring in a girl seven years old. It was attributed to the blow of a whip, which had been received nine weeks before the removal of the tumor. The latter was removed on July 27, 1887, and weighed 80 *grms.* Almost the whole skin and conjunctiva were preserved. On October 6th, a rapidly growing relapse was noticed. MARCKWORT.

The cases of PHILLIPS (466) were those of two brothers, in whom the upper lid drooped in the opposite eye when looking to one side.

VIII.—LACHRYMAL APPARATUS.

470. FIEUZAL. Dacryolythe. *Bull. de la clin. nat. ophth. des quinze-vingts*, 1887, No. 3, p. 159.

471. FROST, A. Chronic enlargement of both lachrymal glands. *Trans. Ophth. Soc. Unit. Kingd.*, vol. vii., p. 112.

472. NOYES, H. D. Removal of prolapsed lachrymal gland. *Amer. Ophth. Soc.*, 1887.

473. RAMPOLDI e FARAVELLI. A proposito di talune malattie dell' apparato lagrimale. *Ann. di ottalm.*, vol. xvi., 4, p. 306.

474. STEAVENSON, W. E., and JESSOP, W. Remarks on electrolysis in the treatment of lachrymal obstruction. *Brit. Med. Jour.*, No. 1408, p. 1371.

FIEUZAL (470) extirpated a chalky concretion the size of a pea from the lachrymal region of a child fourteen years old.

FROST (471) describes a case of chronic enlargement of both lachrymal glands on a specific basis. The left became smaller, while the right continued to grow, so that finally it had to be removed.

NOYES (472) observed a swelling of the upper lid of the right eye, which had been increasing for nine years. It was movable upon the eyeball and accompanied all the movements of the latter. It was extirpated and proved to be the dislocated lachrymal gland.

RAMPOLDI and FARAVELLI (473) investigated the etiology and complications of affections of the lachrymal canal in 122 patients. The female sex was more frequently attacked than the male (78 among 122). In six of the women the disease had developed during pregnancy or lactation. Eighteen of the patients stood in the relation of parents and children, an occurrence which Rampoldi had repeatedly observed in his private patients, making the assumption of hereditary connection necessary. Twenty-eight patients had been affected with small-pox and had pterygia as a complication. In seven cases the pupil on the affected side was enlarged, in three contracted. DANTONE.

IX.—MUSCLES AND NERVES.

475. BJELOW. On the static and dynamic equilibrium of the eyes. *Wjestnik ophth.*, 1887, Nos. 3, 4, and 5.

476. BULL, C. S. Passive motion in the treatment of paralysis of the ocular muscles. *N. Y. Med. Rec.*, 1887, p. 151.

477. BURNETT, S. M. Some thoughts on the etiology of squint. *N. Y. Med. Rec.*, Nov. 12, 1887.

478. CUIGNET. Instruction théoretique et pratique sur l' appareil antistrabique. *Rec. d'ophth.*, 1877, No. 10, p. 577.

479. EMRYS-JONES. Hemorrhage and proptosis after subconjunctival tenotomy of the external rectus. *Ophth. Soc. Unit. Kingd.*, Dec. 7, 1887.

480. GRÄFE, A. The indicated position in operative treatment of paralytic deviations of the eye. *Arch. f. Ophth.*, vol. xxxiii., 3, p. 179.

481. HINDE, A. Periodically recurring oculomotor paralysis. *N. Y. Med. Record*, Oct. 22, 1887.

482. HUTCHINSON, J., Jun. Ophthalmoplegia. *Ophth. Soc. Unit. King.*, July 8, 1887.

483. LANDOLT, E. L'opération du strabisme. *Arch. d'ophth.*, 1887, No. 5, p. 409.

484. MACKINLEY, J. G. Paralysis of both external recti, probably congenital. *Trans. Ophth. Soc. Unit. Kingd.*, vol. vii., p. 298. Report of a case.

485. MASSELON. Considérations générales sur le traitement chirurgical du strabisme. *Rec. clin. d'ocul.*, 1887, No. 11, p. 241.

486. ROHDE, RICHARD. Paralysis of the ocular muscles. *Inaug. Diss.* Regensburg, 1887.

487. SNELL, S. On dividing the rectus tendon from above in the operation for squint. *Brit. Med. Journ.*, p. 1379.

488. STOEBER. Pouvoir convergent binoculaire et angle métrique. *Semaine méd.*, 1887, p. 378.

489. TAYLOR, CH. B. Operative treatment of squint. *Brit. Med. Journ.*, No. 1406, p. 1078.

490. WADSWORTH, O. F. Recurrent paralysis of the motor-oculi. *Amer. Ophth. Soc.*, 1887. Report of case.

BJELOW (475) examined, like Stilling, the position of rest of his visual lines in various ways, all the muscles of the eye being voluntarily relaxed, and found that for his slightly hypermetropic eyes the position of rest was divergence. Voluntary relaxation of the muscles can only be obtained by practice. It does not succeed soon after the eyes have been exerted, nor even after overcoming an adducting prism. He completely disproves Stilling's opinion, that when a distant object is fixed the covered eye

remains in the position of rest. Neither does the position of the eye, under the gently closed lid, or during sleep, always correspond to the position of rest, the "static equilibrium." The results of Stilling would rather apply to the dynamic equilibrium. The author is convinced from his investigations that the position of rest of all eyes is always divergence (never convergence), while in fixation (dynamic equilibrium), as he and others before him have found, emmetropic and hypermetropic eyes have a tendency to converge, myopic eyes a tendency to diverge. The position of rest found by Jaesche he also discards: with a little practice the same conditions of distant vision are found when the plane of fixation is raised or depressed as when it is horizontal. The dynamic equilibrium (*i. e.*, the position of the eyes when in fixing an object binocular vision is prevented) is materially altered by the use of glasses. HIRSCHMANN.

BULL (476) practised the orthopædic treatment of paralyzed muscles recommended by Michel in twenty-one cases, and obtained in eight cases a complete cure, and in six marked improvement.

BURNETT (477) finds that convergent squint is twelve times more frequent in the white race than in the negro. As he finds no greater amount of ametropia in the negro, he is inclined to attribute the greater frequency of squint in the white race to a more firmly fixed habit of convergence among them. Until within a very few years the negro has never had to use his eyes for near work, whereas the white man has been doing it for generations. BURNETT.

EMRYS-JONES (479) observed in a girl ten years old a hemorrhage into Tenon's capsule after tenotomy of the internal rectus, followed by exophthalmus and amblyopia. The pupil was wide, and did not react; the optic disc was pale. Rapid improvement took place after the application of a compressive bandage.

When it becomes necessary to operate in paralysis of the ocular muscles, A. GRÄFE (480) recommends tenotomy of the internal rectus of the other eye in paresis of the external rectus with moderate limitation of the power of abduction. When there is a high degree of secondary convergence, with marked limitation of the power of abduction, advancement should be combined with it, the effect of which may be increased according to circumstances by abscising a piece of the tendon. In the very highest degrees of paralysis and secondary contraction, advancement and

tenotomy on both eyes may become necessary. Paralysis of the superior oblique must be neutralized by tenotomy of the inferior rectus of the other eye. In the very rare cases of paralysis of the inferior oblique, Gräfe recommends tenotomy of the superior oblique of the other eye. In cases of isolated paralysis of the inferior or superior rectus, advancement of the weakened muscle is indicated.

HINDE (481) gives a full description of one of those rather rare recurrent paralyses of the third nerve, associated with amaurosis, hemianæsthesia, and hemiplegia, and he thinks that the most satisfactory explanation of the phenomena is by supposing that there is a lesion of the right cerebral cortex, with a steadily increasing area, spreading backwards to the occipital lobe, and reaching forward to the anterior and posterior central convolutions and paracentral lobule. The cause, he thinks, may have been an angio-neurosis. BURNETT.

HUTCHINSON, Jr. (482) reports on four cases of monocular paralysis of the oculomotor nerve, in which the autopsy was performed. In one of them the inflammation of the right cavernous sinus had caused a similar one of the nerves in its neighborhood. The affection was probably of syphilitic origin, as also in another case.

LANDOLT (483) suggests various methods of modifying the effect of an operation for strabismus, such as exercises of the amblyopic eye, correction of the anisometropia, prisms, the stereoscope, etc. In convergent strabismus he favors an operation on one eye only, tenotomy and advancement, except in alternating strabismus. In divergent strabismus of low degree, with good power of adduction, tenotomy of the external rectus of one or both eyes is sufficient. In marked deviation and feeble power of adduction, advancement and tenotomy of the squinting eye are indicated, sometimes tenotomy and advancement on the other also. In insufficiency of the internal recti, advancement is generally preferable. v. MITTELSTÄDT.

X.—ORBIT.

491. CORVENNE. Sarcome vasculaire de l'orbite. *Bull. de la clin. nat. ophth. des quinze-vingts*, 1887, No. 3, p. 160.

492. REEVE, R. A. Inflammation of the frontal sinus. *Canadian Practitioner*, May, 1887.

CORVENNE'S (491) case was that of a man aged 60, who noticed

that the left eye began to bulge six months ago after being struck with a stone. The eye was totally atrophic and was dislocated downward and inward by a vascular melano-sarcoma, which filled the whole orbit. Two months after the exenteration, in which were included parts of the lachrymal and ethmoid bones, the orbit was filled with healthy granulations. V. MITTELSTÄDT.

REEVE (492) has had twelve cases of this disease under treatment. Of these ten were cases of chronic enlargement. Eight were men and four women. The disease had existed from a few months to thirty-five or forty years, and treatment had extended from a few weeks to twelve months. In four of the cases the origin was nasal catarrh ; in four it was traumatism. In six of the cases the treatment was satisfactory. It consisted in opening the wall and drainage, most frequently through the nose.

BURNETT.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

493. BULLER, F. A rare form of ophthalmia granulosa associated with ichthyosis. *Amer. Journ. Ophth.*, Dec., 1887.

494. FIEUZAL. De la galvanocaustic dans les granulations conjonctivales et les infiltrations cornéennes. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts*, 1887, No. 3, p. 155.

495. HOTZ, F. C. The treatment of hypopyon keratitis with frequent irrigations of corrosive sublimate. *Journ. Amer. Med. Assoc.*, Dec. 17, 1887.

496. LJWOW, J. The question of the prevention of blennorrhea neonatorum. *Diary of the Kasan Med. Assoc.*, 1887, Nos. 8 and 9.

497. RAEHLMANN, E. On the histological structure of trachomatous pannus. *Arch. f. Ophth.*, vol. xxxiii., 3, p. 1.

498. STADERINI. Il sublimato corrosivo nella cura della congiuntivite granulosa. *Morgagni*, vol. xxix., 1887.

499. TALKO, J. Lipo-chondro-adenoma conjunctivae bulbi. *Wjestnik Ophth.*, 1887, Nos. 4 and 5.

500. WASCHEJEWSKY, E. The etiology and treatment of trachoma. *Wojeno med. Jour.*, Oct., 1887.

BULLER (493) relates two interesting cases of granular condition of the conjunctiva associated with ichthyosis, and differing in many essential particulars from trachoma. The granulations are hard and rebellious to treatment, there is no tendency to inflam-

matory exacerbations, and the disease is not contagious. The secretion resembles that of beginning parenchymatous xerosis.

BURNETT.

FIEUZAL (494) recommends the galvano-cautery in granular conjunctivitis, especially when other methods have failed.

HOTZ (495) has tried irrigation with the sublimate solution (1 : 5,000) in twelve cases of hypopyon keratitis and with success. In twenty-four hours after the treatment was begun the hypopyon began to diminish in size. The flooding of the eye was made every hour at first, gradually increasing the interval as the hypopyon subsided. BURNETT.

LJWOW (496) found gonococci in more than half the women he examined, though there were no traces of blennorrhœa. He uses a 1–1½ % solution of nitrate of silver, and got just as good results as with a 2 % solution. Of 914 children treated not one got blennorrhœa. He believes that the solution merely washes out the conjunctival sac, and that probably the same result can be obtained with other liquids. HIRSCHMANN.

RAEHLMANN (497) finds that the first signs of pannus consist in a collection of lymph cells in the corneal tissue beneath Bowman's membrane. Blood-vessels then form in this layer. Subsequently a tissue is found under the anterior limiting membrane which possesses the properties of adenoid tissue. It contains numerous young blood-vessels, lymph vessels filled with white blood corpuscles, and lymph spaces. Next little abscesses form which soon develop into superficial ulcers, which, however, heal rapidly. Typical follicles are discovered, not only superficially, but also in the depth of the tissue. A peculiar kind of connective tissue is formed at an early date in this adenoid tissue. The affection is a true trachoma of the cornea.

STADERINI (498) considers sublimate a specific against trachoma. He brushes a solution, 1 : 300 or 1 : 500, upon the inverted lids, and washes out the eyes every two hours with a lukewarm solution of 1 : 7,000. DANTONE.

WASCHEJEWSKY (500) found that trachoma may be transmitted, not only through trachomatous secretion, but also through that of chronic gonorrhœa. The cocci of the latter closely resemble those of trachoma. He also investigated the effect of various disinfectants on the trachoma-cocci. They were sulphate of zinc, salicylate of sodium, boric acid and iodide of potassium (all in 1–10 % solutions), nitrate of silver, glacial acetic acid, and

carbolic acid (1–3 % solutions), permanganate of potassium (1–5 %), concentrated muriatic acid ($\frac{1}{2}$–2 %), corrosive sublimate (1 : 8,000–1 : 2,000), 1 part of pure iodine and two of iodide of potassium to 5,000 of water, to $\frac{1\,I+2\,KI}{5000}$. The solutions were permitted to act from 1 to 40 minutes. The solution of iodine with iodide of potassium, $\frac{1-2}{5000}$, acted quickly, destroying the vitality of the cocci in five minutes. He accordingly tried it on patients and obtained excellent results. HIRSCHMANN.

501. KAZAUROW. The thermo-cautery in ophthalmology. *Wjestnik Ophth.*, 1887, No. 6.

502. ROSMINI. Sopra un caso di cherato-plastica eseguita mediate innesto di una cornea di coniglio in un individue che ebbe distrutte le cornee della esplosione di un mina. *Gazz. med. Ital.*, 1887, No. 17.

503. SCHÖLER, H. Contribution to the xerotic affections of the cornea, introducing a new form of the disease hitherto not observed by me, the result of an abstinence cure. *Berliner klin. Wochenschr.*, 1887, No. 52.

504. VERDESE, A. Contribution à l'étude de l'anatomie de l'ulcus serpens. *Arch. d'ophth.*, 1887, No. 6, p. 526.

KAZAUROW (501) recommends the thermo-cautery in trichiasis; also for destruction of the lachrymal sac and for corneal staphyloma. In trichiasis he passes the glowing iron along the ciliary margin 2 *mm* from its edge through the skin and even into the tarsus. The results were good, but some of the lashes were destroyed.

In cases of dacryocystitis and ozæna, he recommends destruction of the lachrymal sac before operating for cataract. In corneal staphyloma he perforates it at the most prominent point. There were no injurious consequences. HIRSCHMANN.

ROSMINI (502) transplanted a cornea from a rabbit to a man according to a method devised by Gradenigo, but the result was not entirely satisfactory, as the cornea had become diffusely hazy after two weeks. DANTONE.

SCHÖLER (503) observed a peculiar affection in persons belonging to the wealthier classes, the symptoms of which somewhat resembled those of xerotic conjunctivitis. It occurred in persons whose nutrition had been stinted. The conjunctiva was dry, lustreless, and wrinkled, the cornea partly denuded of epithelium, and the patients had a sensation of dryness. The disease passed

from one eye to the other, and had a tendency to relapses. It was attributable to improper nourishment, too small consumption of liquid, and too much of nitrogenous food.

VERDESE (504) reports on an interesting case of serpent corneal ulcer. It was about *2 mm* in extent, began at the upper corneal margin with a sharp edge, passed through about one third of the cornea, and then slowly merged itself into the level of the latter. There is no epithelium to the extent of several millimetres around the ulcer. Bowman's membrane is considerably thickened at the upper margin of the ulcer, and the corneal lamellæ around it are partially necrosed. The whole corneal tissue, especially near the ulcer, was densely infiltrated with lymph cells. Fontana's space and the ciliary body were filled with wandering cells. The iris was almost normal. No micro-organisms were found. This observation shows that the cornea is directly implicated in the formation of hypopyon by perforation of Descemet's membrane, which takes place before the ulcer has penetrated all the layers of the cornea. V. MITTELSTÄDT.

Sections XII.–XXI. Reviewed by DR. NIEDEN.

XII.—IRIS.

505. GALEZOWSKI. Aniridie traumatique avec luxation du cristallin. *Rev. d'ophth.*, Nov., 1887, p. 642.

506. MULES. Solitary gummatous tumor of the iris. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., p. 148.

507. ZIEM. Iritis in suppuration of the nose and neighboring cavities. *Centralbl. f. Augenhk.*, vol. xi., p. 358.

GALEZOWSKI (505) describes a case of traumatic complete iridodialysis. Some time after the patient had been hit with a waterpot Galezowski discovered that the whole iris had disappeared. At a point behind the limbus corneæ a grayish-red, oblong spot was visible, resembling a small hemorrhage. Galezowski considered this the remnant of the rolled-up iris. The lens was partially dislocated and partially cataractous. To ripen the cataract, and later on account of the secondary cataract, two discissions were made, enabling the patient, with the aid of + 16, to read No. 7 of Galezowski's test-types. The optic nerve, choroid, and retina proved to be uninjured. MARCKWORT.

MULES (506) reports a case of solitary tubercle of the iris in a child aged thirteen months, which showed no symptoms of iritis

or hereditary syphilis. The growth was dispersed by mercurial inunction in seven weeks. WERNER.

ZIEM (507) again calls attention to the close connection between affections of the eye and nose, in connection with the report of three cases of iritis in suppuration from the nose and its neighboring cavities, and believes that he can easily explain the direct transmission of a metastatic suppuration from one cavity to the other on the basis of the vascular connections between the eye and orbit on one side, and the nose and its neighboring cavities on the other.

XIII.—CHOROID.

508. COGGIN, D. A case of neurotomia optico-ciliaris. *Amer. Journ. Ophth.*, Nov., 1887.

509. LAWFORD, J. B. Cases of intraocular sarcoma. *Royal London Ophth. Hosp. Rep.*, vol. xi., 4, p. 400.

510. SARTI. Sarcoma melanotico della coroide. *Riv. clin.*, vol. xxvi., 5, p. 340.

COGGIN'S (508) patient was a woman who had iridocyclitis and refused enucleation. He did an optico-ciliary neurotomy, and eight and a half years afterwards the relief was still manifest. BURNETT.

LAWFORD (509) records 19 (29?) cases of intraocular sarcoma excised at Moorfield's Hospital during three years from June, 1884, to June, 1887. There were 14 males, 15 females. Average age of all, 51. The youngest patient was a female, æt. 33. Local recurrence took place certainly in two cases, and also in two there were metastases. A family history of tumor was present in two cases. In four cases the sarcoma originated in eyes previously blind from other causes, and in five cases there was history of injury with a long interval previous to symptoms of new growth. The tension was increased at the time of excision in eleven, doubtful in one, normal in five, and two were shrunken eyeballs. In one case sympathetic ophthalmia was excited in the sound eye. WERNER.

SARTI (510) describes a round-cell melanosarcoma the size of a hen's egg, which sprang from the choroid and had filled the whole orbit. Neither the neighboring lymph-glands nor any other organ of the body was affected; two months after the extirpation there was no sign of a relapse in the orbit, but the submaxillary and preauricular glands were hard. DANTONE.

XIV.—GLAUCOMA.

511. De Lapersonne. Diagnostic et traitement du glaucome. *Rev. génér. de clin. et de thérap.*, pp. 465, 497.

De Lapersonne (511) recommends the following methods of treatment in the various forms of glaucoma: g. acutum: iridectomy; g. subacutum: myotics, eventually sclerotomy, and if this fails, iridectomy; atrophic glaucoma (Donders): sclerotomy, though with slight chances of success; g. secundarium: different methods, dependent upon the case, generally iridectomy.

XV.—SYMPATHETIC OPHTHALMIA.

512. Cross, F. R. Sympathetic ophthalmitis occurring after evisceration. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., p. 149.

513. Hobby, C. M. Sympathetic ophthalmia. *Journ. Amer. Med. Assoc.*, Oct. 22, 1887.

Cross (512) records two cases of sympathetic ophthalmia occurring after evisceration. In each case artificial vitreous bodies were inserted. Enucleation he considers superior to evisceration, as it more thoroughly removed the exciting disease and tended to resolution of the morbid process without delay. A septic fistula might result from imperfect inclusion of the artificial vitreous.

Werner.

In 300 cases of traumatism of varying kinds to the eye, Hobby (513) has found 35 cases in which the fellow-eye was lost. In 36 cases enucleation was performed during sympathetic irritation or inflammation, and in 5 cases the enucleation was made during a state of panophthalmitis. The period intervening between primary injury and affection of the other eye was less than a month in 22 cases; one to three months in 7; three months to a year in 3; after a year in 33; the shortest time being two weeks and the longest forty years. He has had 2 cases of death following enucleation during panophthalmitis. Other valuable statistics are given.

Burnett.

XVI.—LENS.

514. Alt, A. Some remarks on congenital cataracts. *Amer. Journ. Ophth.*, Dec., 1887.

515. Bogajewsky. Short report on 173 cataract operations done at the hospital at Krementschug. *Wjestnik Ophth.*, 1887, No. 6. Good results, 70 %; loss, 8 %.

516. MONTGOMERY, W. F. After-treatment of cataract-extraction. *Journ. Amer. Med. Assoc.*, Dec. 24, 1887.

517. RAMPOLDI e FARAVELLI. Le operazioni di cataratta eseguite durante l'anno scolastico 1886–87 e il sublimato corrosivo. *Ann. di ottalm.*, vol. xvi., 4, p. 318.

518. SCHISKIN, J. Cataract of both eyes after a stroke of lightning. *Protok. of the Caucas. Med. Assoc.*, 1887, vol. xxiv., No. 10.

519. THOMPSON, J. L. Observations on displacement of the crystalline lens from congenital and other causes. *Journ. Amer. Med. Assoc.*, Nov. 20, 1887.

520. VALK, FRANCIS. Report of four operations for removal of cataract without an iridectomy, and by an entirely new method. *Journ. Amer. Med. Assoc.*, 1887.

521. VIAN. Des progrès accomplés dans le traitement chirurgical de la cataracte et du procédé de choix. *Rec. d'ophth.*, Dec. 17, 1887. (History of cataract operation ; to be continued.)

ALT (514) gives a short *résumé* of thirty-seven operations for congenital cataract done on twenty-six patients. Of these, eleven had zonular cataract in both eyes ; ten total cataract (two shrunken) ; one pyramidal in both ; one shrunken in one and zonular in the other ; one total in one eye alone. The operation generally was that of discission and without an iridectomy. Sometimes a hard nucleus was removed by extraction. The age of the patients varied between one and a half and twenty-seven years.

BURNETT.

MONTGOMERY (516) does not use isinglass-plaster for closing the lids after cataract-extraction, but a light gauze bandage. He closes only one eye and allows the patient to sit up and walk around. In twenty cases thus treated he has had no unfortunate results.

BURNETT.

Since the spring of 1886 RAMPOLDI (517) has used corrosive sublimate in all his operations as an antiseptic. Among 106 extractions (most of them according to Gräfe) the author had only two failures, which strictly cannot be set down as such, as there are chances of obtaining some sight by an iridectomy. DANTONE.

SCHISKIN (518) observed in a boy aged eleven, who had lost consciousness after a stroke of lightning, many characteristic burns, and found when consciousness returned that he was totally blind. His treatment began on the sixth day. Schiskin found

the lids swollen, no perception of light, lenses opaque (bluish white, with radiating spokes). On the ninth day perception of light returned. Two months later the condition of the eyes had not changed. HIRSCHMANN.

THOMPSON (519) reports in more or less detail the histories of twelve cases of congenital dislocation of the lens, and concludes that heredity plays an important part; that it is a dangerous anomaly in so far as it leads to progressive dislocation, cataract, and glaucoma; that the myopia of such cases is due to the malposition of the lens, forming some of the cases of "second sight" in old people; that spontaneous dislocation is due to congestion and subacute inflammation of the uveal tract, and occasionally results in spontaneous cure of cataract by absorption. BURNETT.

VALK'S (520) new method consists in using an iris-retractor to assist in the expulsion of the lens. The instrument resembles an iris-forceps with a small hook in the end of the blades, and with a crossed action, allowing the blades to be held apart by pressure of the fingers. BURNETT.

XVII.—VITREOUS.

522. ZIEMINSKI. Apoplexie générale du corps vitré chez les adolescents. *Rec. d'ophth.*, December, 1887, p. 709. (Discussion of the hemorrhages into the vitreous, especially in regard to the diagnosis. To be continued.)

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

523. BARUCH, S., and PECK, E. S. An interesting case of hysterical amblyopia in the male. *N. Y. Med. Record*, Nov. 19, 1887.

524. BOUVERET. Observation de cécité totale par lésion corticale. *Rev. génér. d'ophth.*, 1887, No. 11, p. 481.

525. Discussion at the special meeting held on June 23d to collect facts in reference to toxic amblyopia. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., pp. 35 ff.

526. DUBOIS DE LAVIGERIE. Accidents oculaires produits par l'inhalation du sulfure de carbone. *Rec. d'ophth.*, September, 1887, p. 525.

527. FROST, W. A. Abnormal course of a branch of the arteria centralis retinæ. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., p. 175.

528. HINDE, ALFRED. A case of right lateral or homonymous hemianopsia, with negative history. *N. Y. Med. Record*, Dec. 17, 1887.

529. MAGNUS. A further contribution to the knowledge of congenital, immediate, grayish-white opacity around the fovea centralis. *Zehender's klin. Monatsbl.*, vol. xxv., p. 375.

530. NETTLESHIP, E. On some of the forms of congenital and infantile amblyopia. *Ophth. Hosp. Rep.*, vol. xi., 4, p. 353.

531. NETTLESHIP, E. Acute temporary amblyopia whilst taking small doses of quinine; history of a previous attack, patient intolerant of quinine. *Ophth. Hosp. Rep.*, vol. xi., 3, p. 218.

BARUCH and PECK (523) report the case of a man twenty-one years of age, who had amblyopia, diplopia, and hemiæsthesia, which were of undoubted hysterical origin. He was an epileptic. Under treatment directed to building up his nervous system all the symptoms disappeared. BURNETT.

BOUVERET (524) reports a case of sudden total blindness, the cause of which at the autopsy proved to be softening of the cortical layer of the medial surface of both occipital lobes, which had been caused by thrombosis of the arteries in question. Similar cases are reported by Seguin (Contribution à l'étude de l'hémianopsie d'origine centrale). *Arch. de neurol.*, March, 1886.

MARCKWORT.

A special meeting (525) was held on June 23d to collect facts in regard to toxic amblyopia, especially as regards the following points: (1) Cases of true alcoholic amblyopia; (2) cases of recovery, without complete discontinuance of the poison; (3) cases of complete persistent pallor of the disc; (4) do second attacks ever occur?

NETTLESHIP had never seen a case of amblyopia in drinkers who did not smoke, or a case of perfect recovery without a diminution in the allowance of tobacco. He read notes of cases illustrating the following points: Improvement may take place if tobacco be stopped, although alcohol is continued; amblyopia is generally due to use of tobacco for many years, but may be caused by very small quantities, *e. g.*, less than one ounce per week; it implies probably an idiosyncrasy of the nervous system. He had seen only one example of relapse. EALES' experience on the whole coincided with Nettleship's. He considered central scotoma for colors absolutely characteristic of tobacco amblyopia.

He never saw atrophy of the disc or blindness supervene. HUTCHINSON, Jr., mentions seven cases in which there was a scotoma for yellow, and one case of central scotoma for blue. GUNN never saw amblyopia in non-smokers; he records a case of recovery with almost perfect vision, but persistent pallor of the entire optic disc. STANFORD MERTON never saw amblyopia in a non-smoker. He records one case of persistent pallor of the disc and one of central scrotoma for blue. EDMUNDS and LAWFORD record a case of axial neuritis in chronic alcoholism, with microscopic examination of optic nerves. FROST records five cases of amblyopia without central scotoma. HILL GRIFFITH gives statistics of sixty-five cases, and concludes that speedy recovery only ensues when the toxic agent is completely given up. He had seen two cases of relapse. Out of one hundred and seventy cases there was not one in which the whole surface of the disc became white. Fourteen of the cases of toxic amblyopia occurred in women. The youngest case of toxic amblyopia seen by BERRY was twenty years old. He had seen several cases in total abstainers, but never could exclude tobacco. He thought that if $V < \frac{20}{200}$ and the scotoma reached the inner side of the point of fixation, recovery would not take place. C. SHEARS gives an analysis of fifty-six cases, no case of alcoholic amblyopia, one relapse, no case of complete persistent pallor of the disc. WERNER.

D. DE LAVIGERIE (526) describes two cases of chronic intoxication with bisulphide of carbon. The symptoms consisted particularly in headache, dizziness, cramps in the legs, pain in the limbs, and diminution of sight (counting fingers at 10 ft.). The field of vision was somewhat contracted for red and green but not for white and blue. There were no scotomata. The papillæ were very pale, but the blood-vessels were of normal calibre. The patients had been exposed while at work to the fumes of bisulphide of carbon. When they were obliged to give it up on account of their poor sight, their condition improved, while it became worse as soon as they took up work again.

MARCKWORT.

FROST (527) gives an illustration of a case in which a vessel equal in size to the arteria centralis emerged from the disc, projected into the vitreous and then bifurcated, each division dipping into the disc again close to the point of exit of the parent trunk. The most prominent part of the vessel was visible with + 10 D. WERNER.

HINDE's (528) case was that of a man aged 57, who noticed a gradual blurring of the right half of the visual field, going into complete hemianopsia in the course of two months. Patient in perfect health and no hereditary or acquired taint. Two years ago he was struck on the left temple with a whiskey-bottle.

BURNETT.

MAGNUS (529) adds another case of congenital whitish-gray opacity surrounding the macula lutea to the three already described (the author, Goldzieher and Knapp), observed in a child 1½ years old with rotary nystagmus. The fovea centralis was of a cherry-red color. A year later the appearance of the fundus had become normal, the nystagmus had disappeared, and central had taken the place of eccentric fixation.

NETTLESHIP's (530) paper is a very long one. It contains reports of cases illustrative of the following groups. 1. Infantile amblyopia from syphilitic choroido-retinitis and hyalitis. 2. Microcephalous infants with gross choroiditis, apparently not syphilitic. 3. Failure of sight without papillitis, coming on during an illness diagnosed as meningitis. 4. Infantile blindness, without meningitis and little or no ophthalmoscopic changes ; more than half are idiotic. In some children blind from birth pupils may react to light. He next considers amblyopia in older patients, under the following heads : 5. Amblyopia with ametropia and sometimes nystagmus. The pedigree is given of a family in which the blue-eyed males alone were affected. 6. Albinos with amblyopia and nystagmus. 7. Cases of night-blindness differing from retinitis pigmentosa in their pathological associations. The ophthalmoscopic changes consist in irregularity of pigment epithelium and scattered minute white dots. In one case 22 members of the family, all males, were affected, and 16 of them inherited through the mother. 8. Cases of congenital day-blindness, with amblyopia, and color-blindness (usually for all colors). Lastly amblyopia of one eye with or without ametropia or squint is discussed. Facts and considerations are brought forward to show that neither of the two theories of amblyopia ex anopsia nor amblyopia from congenital imperfection has as yet been fully established. WERNER.

NETTLESHIP's (531) patient recovered almost completely, but the color-field remained contracted. WERNER.

XIX.—OPTIC NERVE.

532. FROTHINGHAM, GEO. E. Two cases of tumor of the optic nerve. *Journ. Amer. Med. Assoc.*, Dec. 10, 1887.

533. HIRSCHBERG, J. On idiopathic inflammation of the optic nerve. *Centralbl. f. Augenhk.*, vol. xi., p. 321.

534. JACOBSOHN, E. Report of cases of congenital atrophy of the optic nerve. *Centralbl. f. Augenhk.*, vol. xi., p. 362.

535. EDMUNDS and LAWFORD. On optic neuritis in head injuries. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., p. 208.

Both of FROTHINGHAM's (532) cases occurred in young people, one a lad of 7, the other a girl of 17. In both the eyes were enucleated with the tumors. In one case there was a papillitis, in the other not. In the case of the boy the tumor involved the entire substance of the optic nerve from the foramen to the globe, was $1\frac{1}{2}$ in. in its long and $1\frac{1}{16}$ in. in its short diameter. In the other case it was not quite so large, and the ocular end of the nerve was free for about half an inch. Both were round-celled sarcomas. No return to date. BURNETT.

HIRSCHBERG (533) reports four cases of retrobulbar neuritis in relatively young people, of spontaneous origin, and thinks he should call attention to three well defined periods in its course: the first and shortest is marked by great diminution of vision and negative ophthalmoscopic appearance; the second and longer one by gradual loss of sight and distinct inflammation of the papilla; the third and permanent one by almost complete recovery with well defined pallor of the disc without any inflammatory indistinctness.

EDMUNDS and LAWFORD (535) collected 24 cases of head-injuries, and show that optic neuritis occurs much more frequently when the base of the skull or brain is involved. Optic neuritis occurred only twice in 8 cases in which the base was thought to be free, while in 16 cases in which the base was believed to be involved it occurred in 10. WERNER.

JACOBSOHN (534) reports two cases of congenital atrophy of the optic nerve in two children of healthy parents, the other four children not being affected. The papilla was of a grayish-white color, of normal size, with slightly indistinct edge, and surrounded by a bright whitish scleral ring of about half the diameter of the papilla. The blood-vessels are of normal size and well filled. Evidently a pathological change had taken place during uterine life, which had destroyed the fibres of the optic nerve.

XX.—INJURIES; FOREIGN BODIES (PARASITES).

536. HUGHES, HENRY. The cause and manner of rupture of the sclera and choroid. With 24 woodcuts. *v. Gräfe's Arch. f. Ophth.*, vol. xxxiii., 3, p. 21.

537. MULES, P. H. A case of double auto-extraction. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., p. 296.

538. MULES, P. H. Posterior scleral rupture. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., p. 298.

539. MACKINLAY. Complete self-enucleation of eyeball. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., p. 298.

540. SALTINI. Sopra un caso di cisticerco nel vitreo. *Rassegna di scienze med.*, vol. ii., 9.

After describing one of the rare cases of horizontal rupture of the choroid, HUGHES (536) reviews at length the whole literature of scleral and choroidal rupture. The former are generally situated at the upper and medial side (73 %), less frequently (27) at the lateral side of the scleral margin, and have never been observed at the posterior section of the globe. Ruptures of the choroid are generally situated on the temporal side (59 %), rarely on the nasal side (10 %), very seldom (4 %) they extend horizontally. The cause of this typical position is found in the fact that the scleral margin is strained when the eyeball assumes the spherical form, as it is the only zone of the globe which under normal conditions presents a concavity outwards. When this strained part coincides with the fold caused by the traumatism, the rupture must take place at that point. As the majority of foreign bodies, according to the author, strike the eyeball from below and outward, the rupture generally occurs at the upper and nasal portion of the scleral margin. As in choroidal ruptures the blunt force acts upon the eyeball from below and outward, the latter turns inward, and that portion lying laterally from the entrance of the optic nerve is stretched. The rupture passes between the papilla and the macula, and is concentric with the entrance of the optic nerve. When the eyeball is struck from above or below, the tension takes place in a vertical direction, and the portion between the macula and papilla, being immovable on account of its attachments, is subjected to the greatest strain, so that a horizontal rupture is the result. As to the mechanical explanation, see the original. A carefully compiled bibliography is added.

In MULES' case (537) the lenses were removed by injuries, with V ultimately = $\frac{6}{12}$ and $\frac{6}{24}$ on correction. WERNER.

In the case reported by MULES (538) the front of the eye was uninjured, and the media transparent, but the papilla was forced out together with an irrégular margin of sclera. WERNER.

SALTINI (540) observed in a young woman aged twenty-nine, a cysticercus of the vitreous situated near the posterior pole of the lens, the movements of which could be readily seen, even with the naked eye, under oblique illumination when the pupil was dilated. This condition had existed thirteen months, and had begun with symptoms of severe irritation, which, however soon disappeared, and simply left her vision dim. Subsequently the patient was twice attacked with convulsions, but no changes took place in the eye. An operation was refused. The author thinks it was the first case observed in Emilien. DANTONE.

XXI.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

541. BERRY, G. A. On ocular symptoms in cases of cerebral diseases. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., p. 308.

542. BROTZU. Studio clinico sperimentale sulla deviazione conjugata degli occhi. *La Spallanzani*, vol. xvi., 7, p. 308.

543. LAUTENBACH, LOUIS J. General conclusions derived from the study of the eyes of 1,000 insane patients. *Med. News*, Oct. 22, 1887.

544. LANG, W. Case of meningitis after excision. *Trans. Ophth. Soc. Unit. Kingd.*, 1887, vol. vii., p. 319.

545. PANAS. Des manifestations oculaires de la lèpre et du traitement qui leur convient. *Arch. d'ophth.*, 1887, vol. vii., No. 6, p. 481.

546. RAMPOLDI. Cause rare di astenopia di accommodazione. *Ann. di ottalm.*, vol. xvi., 4, p. 270.

547. RAMPOLDI. Contributo alla genesi dell' enoftalmo. *Ann. di ottalm.*, vol. xvi., 4, p. 276.

BERRY (541) records three cases: 1. Acute ophthalmoplegia externa in a girl æt. two and a half years. There was a history of headache and a screaming-fit. Scrofulous disease of one finger. There was distinct improvement under iodide of potassium. The author diagnosed probable tubercular disease of the nuclei, but Gowers thought thrombosis more probable. 2. Megrim associated with spasm of convergence in a girl of eighteen. Extraordinary abnormalities of the bodily temperature were observed. Suspicion of hysteria. 3. Recurrent attacks of bitemporal hemianopsia, with headache and drowsiness, in a man æt. fifty-three. Six at-

tacks occurred. The field was defective to within 5° of the fixation points. WERNER.

BROTZU (542) describes a case of conjugate deviation of both eyes accompanying paralysis of the facial nerve, torsion of the head, and convulsive contraction of the muscles of the neck in a boy of sixteen, of feeble build but otherwise healthy. All of these symptoms disappeared in the course of three months. The author also reports at length on twelve experiments made by Angelucci on dogs, to determine the exact location of the nerve-centre controlling conjugate deviation. DANTONE.

LAUTENBACH (543) found that in the insane the vision for form was practically as in the sane. V.F.F. were often reduced in consequence of nerve-degeneration, pupils more frequently irregular than in the sane. Insufficiencies of the recti frequent in imbeciles and idiots. In acute melancholia there is a congestion of the fundus. In epilepsy there is a tendency to nerve-degeneration and in some cases to retinal effusions. BURNETT.

In LANG'S (544) case there was panophthalmitis and the sclerotic was wounded during excision. Symptoms of meningitis set in the following day, and he died the next. Post-mortem extensive suppurative meningitis was found. The contents of the orbit were examined microscopically. WERNER.

RAMPOLDI (546) mentions several interesting cases of accommodative asthenopia not dependent on hypermetropia; so in hysteria, neuralgias of the fifth nerve, and other more distant ones; also in caries of the teeth. A young man became asthenopic after he had been operated by orcheotomy; another, after he had taken chloroform internally on account of persistent hiccough; in this case there was also slight mydriasis. Finally, the author mentions a patient who had asthenopic symptoms, as soon as he tried to read while in a warm bath. DANTONE.

RAMPOLDI (547) observed in three cataract patients internal hæmophthalmus, after the patients had been greatly excited by the visit of relatives and had cried. In another patient, who had been operated six days previously, and had an iritis, the author observed the hemorrhage 6–10 hours after the heavy hair had been cut off. DANTONE.

PANAS (545) cured two patients suffering with tubercular leprosy of the sclero-corneal margin by extensive excision and subsequent application of carbolic acid and iodoform salve. He prefers this treatment to simple marginal keratotomy, which he

does not consider sufficiently energetic. He describes the appearance of leprous ocular affections in anæsthetic leprosy, which leads to blindness by lagophthalmus, xerosis of the cornea, in rare cases also by iritis and cataract, or phthisis, and also the tubercular form, which attacks the cornea from the limbus, extends to the iris and choroid, and also destroys sight.

v. MITTELSTÄDT.

MISCELLANEOUS NEWS.

The next (8th) INTERNATIONAL OPHTHALMOLOGICAL CONGRESS will be held at Edinburgh, Scotland, in six years. Committee of organization: ARG. ROBERTSON and BERRY.

Dr. FIEUZAL, ophthalmic surgeon to the Clinique Nationale Ophthalmologique des Quinze-Vingts, is dead. He was a man in the prime of life, of high scientific attainments, great practical ability, and indefatigable industry. We are informed that Drs. ABADIE and TROUSSEAU have been appointed as his successors.

Dr. C. HORSTMANN has been appointed extraordinary professor of ophthalmology in the University of Berlin.

Dr. H. KNAPP has been appointed professor of ophthalmology at the College of Physicians and Surgeons in the City of New York. His successor at the Medical Department of the University of the City of New York is Dr. C. S. BULL.

Fig. I.

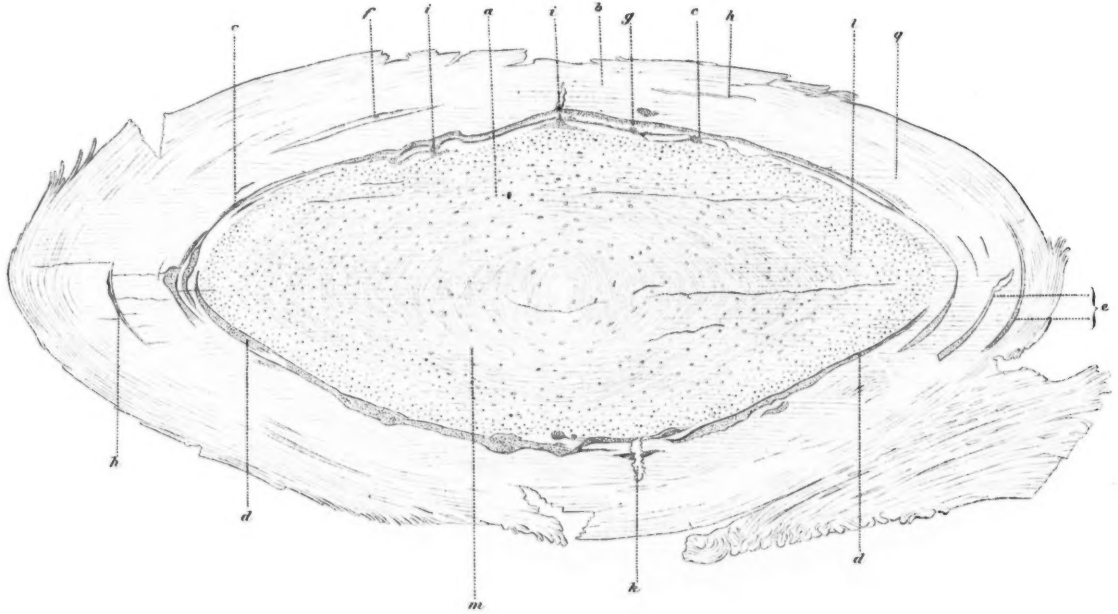

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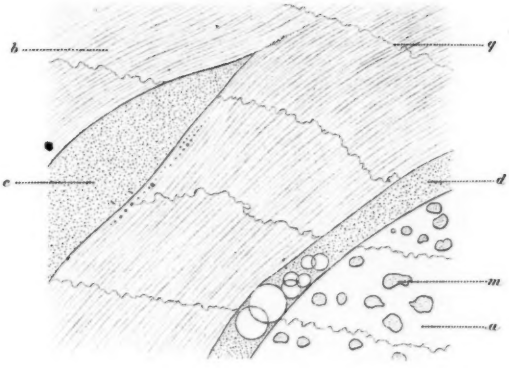
Fig. 2.



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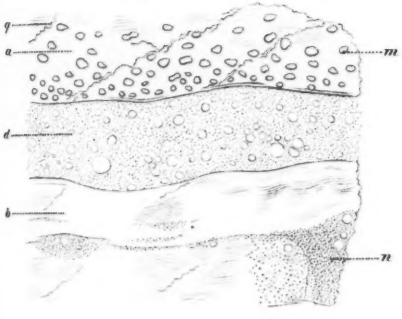

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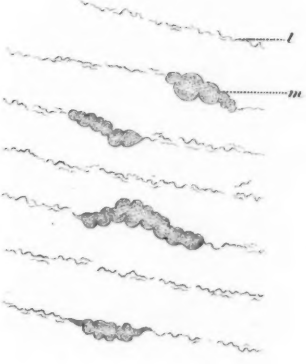

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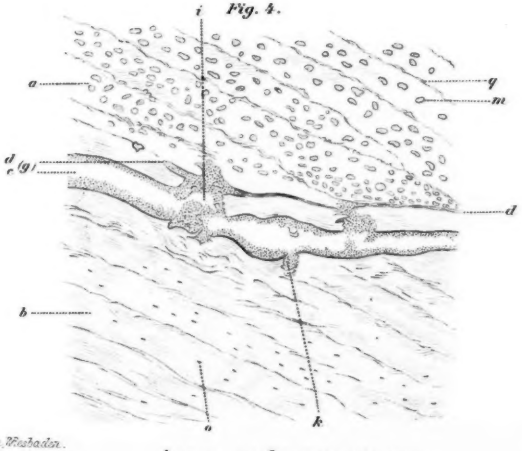

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